4281 69966

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Date 7/1/02 Serial # 09/887,927 Priority Application Date 6/29/01

Your Name M. Lewis Examiner # _____

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Other: _____

What relevant art have you found so far? Please attach pertinent citations or Information Disclosure Statements. _____

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What is the topic, such as the **novelty**, motivation, utility, or other specific facets defining the desired **focus** of this search? Please include the concepts, synonyms, keywords, acronyms, registry numbers, definitions, structures, strategies, and anything else that helps to describe the topic. Please attach a copy of the abstract and pertinent claims.

Claims 1-6

Problem: See Page 1 lines 10-27

Solution: " " 2 " 1-9

Novelty in structure

Staff Use Only	Type of Search	Vendors
Searcher: Derrick Holdick	Structure (#) _____	STN ✓
Searcher Phone: _____	Bibliography ✓	Dialog _____
Searcher Location: STIC-EIC2800, CP4-9C18	Litigation _____	Questel/Orbit _____
Date Searcher Picked Up: 7/1/02	Fulltext _____	Lexis-Nexis _____
Date Completed: 7/2/02	Patent Family _____	WWW/Internet _____
Searcher Prep/Rev Time: 60	Other _____	Other _____
Online Time: 100		

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     FILE 'REGISTRY' ENTERED AT 16:03:38 ON 01 JUL 2002
L1        44889 S SN/ELF AND AYS/CI
L2       257754 S NI/ELF AND AYS/CI
L3       105731 S CO/ELF AND AYS/CI
L4            1 S TIN/CN
L5            1 S NICKEL/CN
L6            1 S COBALT/CN

     FILE 'HCAPLUS' ENTERED AT 16:04:52 ON 01 JUL 2002
L7        56172 S COAT####(2N)METAL
L8        15063 S (TIN OR SN)(W)(ALLOY)
L9        66299 S (NI OR NICKEL)(W)(ALLOY)
L10       22389 S (CO OR COBALT)(W)(ALLOY)
L11         171 S (TIN OR SN) ()(WHISKERS)
L12        7676 S MICROMETER
L13       88098 S MPA
L14      106134 S (FILM OR LAYER? OR COAT#### OR UNDERLAYER? OR TOPLAYER? OR UN
L15        1123 S L7 AND (L1 OR L8)
                E TENSILE STRESS/CT
L16       12740 S TENSILE STRESS
L17           1 S L15 AND L16
L18      146579 S (COAT#### OR FILM OR LAYER)(2N)METAL?
L19        2282 S L18 AND (L1 OR L8)
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L25         170 S L16 AND (L1 OR L8)
L26           0 S L25 AND L12
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L29          34 S L25 AND METAL
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L32        5229 S L31 NOT (L20 OR L21 OR L24 OR L27 OR L29)
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L34          66 S L32 AND L13
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L38           2 S L19 AND L37
L39           2 S L38 NOT (L20 OR L21 OR L24 OR L27 OR L29 OR L35 OR L33)
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L41         124 S L37 AND (L1-6)
L42          23 S L41 AND METAL
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L50           2 S L19 AND L37
L51           1 S L31 AND L37
L52           0 S L45 AND L37
L53           0 S (L50 OR L51) NOT (L20 OR L21 OR L24 OR L27 OR L29 OR L35 OR L
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L17 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:763088 HCAPLUS
DN 132:14424
TI Tensile properties of duplex **metal-coated** SiC fiber and titanium alloy matrix composites
AU Guo, S. Q.; Kagawa, Y.; Fukushima, A.; Fujiwara, C.
CS Institute of Industrial Science, The University of Tokyo, Tokyo, 106-8558, Japan
SO Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science (1999), 30A(11), 3019-3024
CODEN: MMTAEB; ISSN: 1073-5623
PB Minerals, Metals & Materials Society
DT Journal
LA English
AB Silicon carbide fiber-reinforced Ti alloy matrix composites had a great potential for high-temp. aerospace structural applications, and it was known that the interface reaction between the SiC coating and the Ti alloy matrix resulted in intermediate layers consisting of nonstoichiometric Ti carbides and silicides. Continuos SiC fiber was used for Ti coating, and layers of pure Cu, Ta, Mo, and W were deposited on the surface of the fibers at 10-3 Pa and 470-570 K.. The effect of the duplex **metal coatings** on the SiC fiber strength after heat exposure to 1153 K for 1.5 h in the vacuum was investigated, and the morphol. of the fibers was obsd. by SEM and the stability of duplex **metal coatings** were evaluated by energy dispersive x-ray measurement. The **tensile stress** strain curves for the produced duplex **metal coated** SiC fiber reinforced Ti matrix composites were detd., and the results demonstrated advantages of Cu/Mo coating.

L20 ANSWER 1 OF 3 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:639403 HCAPLUS
DN 133:211580
TI SCC susceptibility and its correspondence to dezincification layer-induced stress for brass
AU Guo, Xianzhong; Gao, Kewei; Qiao, Lijic; Chu, Wuyang
CS Department of Materials Physics and Chemical, University of Science and Technology Beijing, Beijing, 100083, Peop. Rep. China
SO Jinshu Xuebao (2000), 36(7), 753-756
CODEN: CHSPA4; ISSN: 0412-1961
PB Kexue Chubanshe
DT Journal
LA Chinese
AB Brass foil with a protective layer formed on one side was deflected during corrosion in an ammonia soln. at various applied potentials, and then corrosion-induced stress generated at brass/dezincification layer at different potentials could be measured. At the same time, susceptibility to stress corrosion cracking (SCC) of brass in the ammonia soln. at various applied potentials was measured using a single-edge notched specimen. A **tensile stress** will be generated at the **metal**/dezincification **layer** interface during original corrosion for brass in an ammonia soln. The av. stress of the whole specimen is 18.1 MPa. Dezincification layer-induced **tensile stress** decreased slightly under anodic polarization, but reduced steeply with the increase in potential of cathodic polarization. At the cathodic potentials, corrosion-induced stress became compressive because of the copper-plating layer. Therefore, the variation of SCC susceptibility with potential is consistent with that of the corrosion-induced additive stress.

L20 ANSWER 3 OF 3 HCAPLUS COPYRIGHT 2002 ACS
AN 1978:495615 HCAPLUS
DN 89:95615
TI Perturbation of parabolic kinetics resulting from the accumulation of stress in protective oxide layers
AU Evans, H. E.; Norfolk, D. J.; Swan, T.
CS Berkeley Nucl. Lab., CEGB, Berkeley/Gloucestershire, Engl.
SO J. Electrochem. Soc. (1978), 125(7), 1180-5
CODEN: JESOAN; ISSN: 0013-4651
DT Journal
LA English
AB A frequent observation in metal oxidn. is the development of subparabolic kinetics, variously described as cubic or quartic. Although a no. of detailed mechanisms have been proposed to account for this effect, none seem generally applicable. This paper presents a model of the oxidn. process which is divorced from such restrictions. Deviations from parabolic behavior occur as a result of the concurrent development of stresses within the oxide. The presence of stress fields can influence significantly the rate of transport of vacancy defects within the oxide such that **tensile stresses** produce pos. deviations and compressive stresses, neg. deviations from parabolic behavior. The model is applied in detail to Zircaloy-2 oxidn. at 773 K. The kinetics should be insensitive to the O potential of the environment and this is confirmed by previous exptl. work. In addn., the abs. value of the oxidn. rate is closely predicted using measured values of diffusion coeffs. and the obsd. gradual departure from parabolic kinetics with increasing oxide thickness is accounted for.

L22 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:767718 HCAPLUS
DN 128:104994
TI Defect structures in metals exposed to irradiation of different nature
AU Sharkeev, Yu. P.; Kozlov, E. V.; Didenko, A. N.
CS Materials Science of RAS, Institute of Strength Physics, Tomsk, Russia
SO Surface and Coatings Technology (1997), 96(1), 95-102
CODEN: SCTEEJ; ISSN: 0257-8972
PB Elsevier Science S.A.
DT Journal
LA English
AB The regularities of the defect structure formation in near-surface **layers** of **metals** and alloys under irradn. of different types are presented. Three types of irradn. were used to treat the targets: high-dose ion implantation (HDII), high-power ion beam (HPIB) and high-power pulsed microwave (HPPM). In the case of HDII the continuous and repetitively-pulsed regimes were used. Different ions (B, C, Ar, Fe, Ni, Hf, Cu, Mo, Pb, Zr, La, W, Dy) of 40-200 keV energy were implanted to the irradn. dose of 1.times.1016 to 1.times.1018 ion cm-2 in .alpha.-Fe, Cu and Mo metals and Ni3Fe, Cu-Co-Al and VT18U alloys. Two-component pulsed HPIB (50 C+50 H) was used to treat .alpha.-Fe. The energy of ions was 300 and 400 keV, the ion c.d. was 60, 100 and 200 A cm-2 and the pulse duration was .apprx.100 ns. Cu, .alpha.-Fe, Ni and Mo metals were exposed to HPPM with wavelengths of 2.85 and 10.0 cm. The microwave power flux d. was varied from 2 to 400 kW cm-2, whereas the pulse duration was varied from 50 to 300 ns. The exposure to HDII, HPIB or HPPM irradn. leads to the generation of dislocations in the near-surface **layer** of **metallic** materials. The thickness of the near-surface layer with induced dislocation structure depends on the type of irradn. and is equal to several **micrometers** for HPPM, tens of **micrometers** for HDII and hundreds of **micrometers** for HPIB. The defect structures induced by irradiations mentioned above are similar to the defect structures formed in metals and alloys during plastic deformation at one-axis tension or compression. The main reason for defect structure formation in the metals exposed to irradn. is the high level of stresses originating in the target near-surface layer. The mechanisms of stress origination, the value and the nature of the stresses are detd. by the type of irradn.

L24 ANSWER 1 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:793739 HCAPLUS
DN 135:347634
TI Coating of tin or tin oxide having photocatalyst function on moldings from metal and/or ceramics
IN Miyasaka, Yoshio
PA Fuji Kihan K. K., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001303274	A2	20011031	JP 2000-124879	20000425

AB Moldings from metals and/or ceramics are coated with Sn oxide by jetting a powder from Sn, **Sn alloy** or their mixt. with noble metalat a jetting velocity of .gtoreq.80 m/s or a jetting pressure of .gtoreq.0.3 **MPa**. The Sn oxide-coated moldings have photocatalyst function such as deodorization, sterilization, etc. of water.

L24 ANSWER 2 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:319562 HCAPLUS
DN 134:330093
TI Fiber-reinforced metal-matrix composites suitable for rapid prototyping by local melt deposition
IN Shaikh, Furqan Zafar; Blair, Howard Douglas; Pan, Tsung-yu
PA Ford Global Technologies, Inc., USA
SO Eur. Pat. Appl., 3 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1096032	A2	20010502	EP 2000-308787	20001005
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
US 6376098	B1	20020423	US 1999-432047	19991101
PRAI US 1999-432047	A	19991101		

AB The metal-matrix composite includes the reinforcing fibers having av. diam. of .apprx.8 .mu.m with a **coating**, and a **metal** (or alloy) matrix distributed with the fibers at the fiber:metal ratio of (1-9):1 by vol. The composite is typically based on **Sn alloys** for the melting temp. of 130-280.degree. and nominal tensile strength of 95-270 **MPa**. The chopped fibers have the nominal length/diam. ratio >10, and are precoated with 0.3-1.5 .mu.m layer of Ni, Au, or In to promote wetting with the matrix alloy. The prototype part is manufd. by local deposition of the molten composite at nominally .ltoreq.250.degree. followed by solidification, vs. .apprx.650.degree. required for Al alloys. The Sn-37% Pb alloy can be reinforced with carbon fibers precoated with a metal for wettability, resulting in the composite having tensile strength of 95 **MPa**, vs. 30 **MPa** for the matrix alloy.

L24 ANSWER 3 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:620765 HCAPLUS

DN 133:194757
TI Sliding bearing with a resin layer consisting of soft metal particles dispersed in thermosetting resin
IN Tanaka, Takuya; Hiramatsu, Nobutaka; Ono, Akira; Yamomoto, Koichi; Shibayama, Takayuki
PA Daido Metal Co., Ltd., Japan
SO Brit. UK Pat. Appl., 21 pp.
CODEN: BAXXDU
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI GB 2345095	A1	20000628	GB 1999-29311	19991210
GB 2345095	B2	20010214		
JP 2000240657	A2	20000905	JP 1999-331590	19991122
US 6305847	B1	20011023	US 1999-457317	19991209
PRAI JP 1998-365184	A	19981222		

AB A sliding bearing with small friction coeff., excellent wear resistance and anti-seizure property has its bearing **metal layer** covered by a coating layer comprising a thermosetting resin, 0.1 to 10% (vol./vol.) soft metal particles, .ltoreq. 80% (vol./vol.) solid lubricant, and .ltoreq. 5% (vol./vol.) hard particles. Thus, a coating comprising polyimide (AI 10) 92 parts, soft metal particle (Cu) 3 parts, solid lubricant (MoS2) 5 parts was coated on a Cu-Pb-**Sn alloy** bearing, showing friction coeff. of 0.06, wear amt. 5 .mu.m and specific load of seizure occurrence of 21 **MPa**.

L24 ANSWER 4 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:531543 HCAPLUS
DN 133:138802
TI Abrasive strip manufactured with sintered metal-bonded grit on a foil substrate
IN Caracostas, Constantinos A.; Andrews, Richard M.; Miller, Bradley J.
PA Norton Co., USA
SO U.S., 5 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 6096107	A	20000801	US 2000-476506	20000103

AB Powd. mixt. of the abrasive hard grit and alloy binder is applied as a uniform **layer** on a **metal** foil supported by a rigid substrate, followed by patterned roll-pair pressing at nominally 207-690 **MPa** for improved bonding, and heating the powder-clad foil for sintering. The hard grit is preferably selected from cubic BN or diamond particles of 1-100 .mu.m size, and is typically bonded with the Cu alloy contg. 5-50% of Sn. The foil-based composite is sintered to <20% porosity, and is suitable for abrasive tools with optional lamination to a flexible polymer or fabric substrate.
RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L24 ANSWER 5 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:736319 HCAPLUS
DN 132:71908
TI Development of under bump metalizations for flip chip bonding to organic

substrates
AU Korhonen, T. M.; Su, P.; Hong, S. J.; Korhonen, M. A.; Li, C.-Y.
CS Department of Materials Science and Engineering, Cornell University, Ithaca, NY, 14853, USA
SO Journal of Electronic Materials (1999), 28(11), 1146-1149
CODEN: JECMA5; ISSN: 0361-5235
PB Minerals, Metals & Materials Society
DT Journal
LA English
AB Several under bump metalization (UBM) schemes using CuNi alloys as the solderable layer were studied. Nickel slows down dissoln. of the UBM into the solder and formation of intermetallics during reflow. To study the intermetallic reaction, CuNi foils of different concns. were immersed in a eutectic PbSn solder bath for reaction times ranging from 30 s to 30 min. When 10% and 20% Ni is added into copper, the intermetallic forms a continuous layer, instead of the discrete scallops seen in pure Cu/solder interfaces. However, the thickness of the intermetallic remained about the same. For 30% and 45% Ni alloys a definite decrease in the intermetallic thickness was obsd. compared to the lower Ni alloys. Actual under bump metalizations were also made on Si wafers to study the reactions when there is a limited supply of CuNi available. Cr or Ti was used as the adhesion layer, and the solderable layer was a copper-nickel alloy, instead of pure copper used in the conventional UBM scheme. The **metal layers** were deposited on a wafer by evapn. and patterned into contact pads. Eutectic PbSn solder balls were reflowed on top of the pads. SEM micrographs of the intermetallic that forms at the UBM/solder interface show the refining effect of Ni in the interfacial microstructure. Since nickel metalizations often have high stresses, stress in the UBMs was measured by the wafer curvature method. Stress vs. Ni content plots show that while stresses increase somewhat with the Ni content, the adhesion layer under the CuNi layer has a much larger effect on the stress. UBMs with Cr/CrCu adhesion layer had stresses ranging from .apprx.300 to 600 **MPa**, while the stresses in UBMs with Ti/TiNi layers were 70-350 **MPa**.
RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L24 ANSWER 6 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:424551 HCAPLUS
DN 131:217333
TI A trial of bond bridge formation with extracted metals from colloidal solution
AU Truong, Son Hoanh; Isono, Yoshitada; Tanaka, Takeshi
CS Graduate Student, Mechanical Engineering, Ritsumeikan University, Shiga, 525-8577, Japan
SO International Journal of the Japan Society for Precision Engineering (1999), 33(1), 40-42
CODEN: IJJEEA; ISSN: 0916-782X
PB Japan Society for Precision Engineering
DT Journal
LA English
AB A method of **metal coating** was done by metal extn. from a colloidal soln. Bond bridges are formed by vacuum sintering of the coated diamond abrasive particles. The principal of metal extn. and its possibility to manuf. diamond grinding wheels are explored. Abrasive particles can be **coated** by **metals** extd. from a colloidal soln. Because Sn flows out during melting at the higher sintering temps., a small amt. of Sn is better in the Ag-Cu-**Sn alloy** series. A lower temp. and shorter duration are sufficient

to form the bond bridges. In the Ag-Cu series, stronger bond bridges form in Ag-Cu levels of 30-70 wt.%. A bend strength of 24 **MPa** is sufficient for grinding wheels. Sintering at 1073 K for 20 min is sufficient to form the bond bridges and pores.

RE.CNT 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L24 ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:393039 HCAPLUS
DN 131:22081
TI Reactive spray **coating** of **metal** surface to form hard nitride layer
IN Miyasaka, Yoshio
PA Fuji Kihan Co., Ltd., Japan
SO Eur. Pat. Appl., 10 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 922786	A2	19990616	EP 1998-890342	19981117
	EP 922786	A3	20010425		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	JP 11217678	A2	19990810	JP 1998-278612	19980930
	US 2002009542	A1	20020124	US 1998-197722	19981123
PRAI	JP 1997-323333	A	19971125		

AB A sprayed powder of 20-200 .mu.m size (esp. Ti) is applied on a metal surface in the presence of N2 or a similar reactive gas, resulting in the deposition of nitride as adherent hard layer for increased resistance to corrosion and wear. The spray coating with Ti powder in N2 atm. promotes the formation of decorative gold-colored TiN film using low-priced equipment. The powder feed is typically sprayed at .gtoreq.80 m/s and/or the ejection pressure .gtoreq.0.3 **MPa** to promote impact heating and the adherent film formation. Powd. Ti was sprayed at .gtoreq.80 m/s with N2 on the surface of Ti-6Al-4V alloy, resulting in the formation of gold-colored TiN film for increased surface hardness. The similar process with the spraying of ceramic powder on a reactive metal surface in N2 is suitable for nitridation of the metal surface.

L24 ANSWER 8 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:147842 HCAPLUS
DN 130:171572
TI Method for bonding a optical materials, especially quartz glass and calcium fluoride, to metallic components, and the assembly obtained
IN Holderer, Hubert; Deyhle, Johannes; Dietenmeier, Ulrich
PA Fa. Carl Zeiss, Germany
SO Ger. Offen., 6 pp.
CODEN: GWXXBX
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 19735760	A1	19990225	DE 1997-19735760	19970818
	EP 901992	A2	19990317	EP 1998-112829	19980710
	EP 901992	A3	20000105		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				

IE, SI, LT, LV, FI, RO
JP 11228192 A2 19990824 JP 1998-222709 19980806
PRAI DE 1997-19735760 19970818
AB The method comprises applying to the contact surface a bonding interlayer and a solderable diffusion barrier, providing the metallic component with a solder layer, contacting the surfaces to be bonded with each other, and heating both surfaces to the melting temp. of the solder. The assembly comprises the optical component, the bonding interlayer, the diffusion barrier, preferably a 1st oxidn.-resistant layer, preferably a 2nd oxidn.-resistant layer, solder, a wetting-promoting layer if necessary, and the metal of the metallic component, with transition layers, esp. in a way typical for sealing and, optionally, under diffusion of the 2 oxidn.-resistant layers into the solder. An assembly consisted of a CaF2 lens provided with a Cr bonding interlayer (0.5 .mu.m), a Ni diffusion barrier (5 .mu.m), a 1st and 2nd oxidn.-resistant layer of Au (0.1 .mu.m each), SnPb solder (m. 183.degree.; 100 .mu.m), a Ni wetting-promoting layer (5 .mu.m), and stainless steel holder. The tensile strength of the bond was 15 **MPa**.

L24 ANSWER 9 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:701500 HCAPLUS
DN 127:335575
TI Permeable compositions and preforms adapted for use as reinforcing component in composites comprising the reinforcing component embedded in a matrix material
IN Kennedy, Christopher Robin; Sonuparlak, Birol; Fareed, Ali Syed; Garnier, John Edward; Schiroky, Gerhard Hans; Landini, Dennis James; Irick, Virgil, Jr.
PA Lanxide Technology Co., LP, USA
SO U.S., 52 pp., Cont.-in-part of U.S. 5,389,450.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 6

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 5682594	A	19971028	US 1995-472613	19950607
	US 5202059	A	19930413	US 1987-61854	19870612
	US 5330849	A	19940719	US 1992-862397	19920402
	US 5389450	A	19950214	US 1993-3202	19930111
PRAI	US 1987-61854		19870612		
	US 1992-862397		19920402		
	US 1993-3202		19930111		

AB The coated ceramic fillers comprise ceramic particles, fibers, whiskers, etc., provided with .gtoreq.2 substantially continuous coatings. The coatings are selected so that the interfacial shear strength between the ceramic filler and the 1st coating, between coatings, and between the outer coating and the surrounding matrix material, is not equal and permits debonding and pull-our when fracture occurs. The resultant, multilayer-coated ceramic fillers are employed to provide composites, esp. ceramic matrix composites, having increased fracture toughness. The ceramic fillers are designed to be esp. compatible with ceramic matrixes formed by direct oxidn. of precursor metals, but such ceramic filler materials are also adaptable for use in many other composite material systems. Preferably, the coatings are applied to the ceramic fiber plies or preforms by CVD. Accordingly, coatings more uniform through the cross-section of the preforms are achieved by assembling the preforms with exterior fabric plies having greater gas permeability than the fibrous preform or fabric plies located deeper in the preform interior. Addnl.,

.gtoreq.1 addnl. fillers, different in some respect from a 1st fibrous filler, are provided to the permeable mass to be infiltrated with matrix material. The addnl. filler is provided for the purpose of tailoring .gtoreq.1 addnl. properties of the self-supporting composite bodies to be formed not already tailored by the 1st fibrous filler. Nicalon (SiC fibers; length .apprx.2 in.; diam. 10-20 .mu.m) were coated by chem. vapor deposition with 1st coating (thickness 0.2-0.5 .mu.m) of BN, and a 2nd coating (thickness 1.5-2.0 .mu.m) of SiC. The coated fibers were gathered into bundles, each contg. 500 fibers tied with a single fiber tow. Al alloy 380.1 bars (2 in. square by 1/2 in.) were placed in a bed of wollastonite in a refractory crucible such that a 2 in. square face of each bar was exposed to the atm. and substantially flush with the bed. The remainder of each bar was submerged beneath the surface of the bed. A thin layer of sand (as addnl. dopant) was dispersed over the exposed surface of each bar, and 3 of the bundles of coated fibers were placed on top of each of the 2 sand-covered metal surfaces and covered with wollastonite. The crucible was placed in a furnace supplied with O at flow rate 500 cm3/min, and heated to 1000.degree. at 200.degree./h, and held at 1000.degree. for 54 h. The resulting ceramics had notched fracture toughness, 19 and 17, vs. 5-6 **MPa**.m1/2 for composites contg. uncoated fibers.

L24 ANSWER 10 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:458392 HCAPLUS
DN 127:165549
TI Bonding of aluminum nitride to copper by surface modification. 2. Metalizing of AlN by ion plating
AU Saida, Kazuyoshi; Nishimoto, Kazutoshi; Fujimoto, Tetsuya; Tanaka, Katsuyuki; Fukaya, Yasuhiro
CS Fac. Eng., Osaka Univ., Japan
SO Yosetsu Gakkai Ronbunshu (1997), 15(2), 330-337
CODEN: YGRODU; ISSN: 0288-4771
PB Yosetsu Gakkai
DT Journal
LA Japanese
AB Metalization method of AlN substrate by ion plating technique has been developed. Dual coating films of 5-10 .mu.m thick nitrides (TiN, ZrN and CrN) and 10 .mu.m thick copper were formed on the AlN substrate by ion plating. The functionally gradient films of TiN .fwdarw. Ti were also deposited on the AlN substrate. The adherent strength of **metalized films** against AlN substrate was evaluated by the tensile test at room temp. The morphologies of nitride films were quite sound and they were stuck AlN together well. Element analyses by EPMA and ESCA revealed that nitrides such as TiN, ZrN and CrN were hardly reacted with AlN substrate of Cu film. The adherent strength of TiN, ZrN, CrN coating film and the functionally gradient films indicated the av. values of 50-60 **MPa** in any cases. The joint strength of TiN+Cu dual metalized AlN to copper soldered by Sn-38 mass%Pb solder was about 33 **MPa**.

L24 ANSWER 11 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:388503 HCAPLUS
DN 127:114325
TI High pressure hydriding of sponge-Zr in steam-hydrogen mixtures
AU Kim, Yeon Soo; Wang, Wei-E.; Olander, D. R.; Yagnik, S. K.
CS Department of Nuclear Engineering, University of California, Berkeley, CA, 94720, USA
SO Journal of Nuclear Materials (1997), 246(1), 43-52
CODEN: JNUMAM; ISSN: 0022-3115

PB Elsevier
DT Journal
LA English
AB Hydriding kinetics of thin sponge-Zr **layers** **metallurgically** bonded to a Zircaloy disk has been studied by thermogravimetry in the temp. range 350-400.degree. in 7 **MPa** hydrogen-steam mixts. Some specimens were prefilmed with a thin oxide layer prior to exposure to the reactant gas; all were coated with a thin layer of gold to avoid premature reaction at edges. Two types of hydriding were obsd. in prefilmed specimens, viz., a slow hydrogen absorption process that precedes an accelerated (massive) hydriding. At 7 **MPa** total pressure, the crit. ratio of H2/H2O above which massive hydriding occurs at 400.degree. is .apprx.200. The crit. H2/H2O ratio is shifted to .apprx.2.5.times.103 at 350.degree.. The slow hydriding process occurs only when conditions for hydriding and oxidn. are approx. equally favorable. Based on max. wt. gain, the specimen is completely converted to .delta.-ZrH2 by massive hydriding in .apprx.5 h at a hydriding rate of .apprx.10-6 mol H/cm2 s. Incubation times of 10-20 h prior to the onset of massive hydriding increases with prefilm oxide thickness in the range of 0-10 .mu.m. By changing to a steam-enriched gas, massive hydriding that initially started in a steam-starved condition was arrested by re-formation of a protective oxide scale.

L24 ANSWER 12 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:601316 HCAPLUS
DN 125:335852
TI Phase composition of layers forming on the metals and alloys in the atmosphere of sulfur hexafluoride
AU Gladkova, V. F.; Nechaeva, V. G.
CS "Prikladnaya Khimiya" RHTs, St. Petersburg, Russia
SO Zh. Prikl. Khim. (S.-Peterburg) (1996), 69(6), 881-884
CODEN: ZPKHAB; ISSN: 0044-4618
DT Journal
LA Russian
AB The compn. of surface phases forming on metals and alloys in the SF6 atmosphere, phase changes at 300-600.degree. (P=1 **MPa**, t=20 h), and correlation between the surface layer compn. and corrosion rate were studied. During interaction of the steels with SF6, the FeF2 and FeF3 were formed on their surfaces. With increasing temp., the amt. of FeF3 increased, which resulted a substantial increase in the corrosion rate. The fluoride phases and Al2S3, CuS, and NiS were formed on the surfaces of Al, Cu, Ni, and their alloys during the interaction with SF6. The Al2S3 formation on the surface of Al AD1 resulted in a noticeable increase in the rate of its interaction with SF6.

L24 ANSWER 13 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:351870 HCAPLUS
DN 125:46239
TI Si circuit chip joining technology using Ar atom bombardment
AU Kohno, A.; Sasaki, Y.; Horino, M.; Usami, M.; Tokuda, M.; Sahara, K.
CS Ibaraki, Japan
SO DVS Ber. (1996), 173(EuPac 96), 41-47
CODEN: DVSBA3; ISSN: 0418-9639
DT Journal
LA English
AB This paper describes an alternative Si circuit chip joining technique in which an Ar atom beam was used to sputter-clean the surface to be bonded. This method is based on the strong adhesive bond that develops at the interface between two clean, smooth surfaces. Factors affecting bond

quality are discussed, and results are given showing the feasibility of mounting an LSI chip or a thin LSI film on a substrate. Before bonding an LSI chip to a substrate face down through CCB bumps of Pb-**Sn alloy**, bumps on the chip and electrodes on the substrate were 1st sputter-cleaned by Ar atom bombardment. The bumps were pressed against the electrodes to achieve temporary bonding, after which they were reflowed into spherical shapes by reflow heating in a very pure inert gas atm. Pull tests showed values similar to those obtained with conventional flux joining. This process eliminates the need for using chem. flux to obtain high-quality solder joints. In bonding a thin LSI film to a Si substrate, the surfaces to be bonded were metalized with Au deposition film. After irradiating the bonding surfaces with an Ar at. beam, they were bonded at 423 K and a pressure of 10 **MPa**. Elec. properties of the bonded LSI were the same as before bonding. The joint had good thermal cond. at the interface and a shear strength of 10 **MPa**. This process makes it possible to bond an LSI film to a substrate without causing thermal, mech., or elec. damage.

L24 ANSWER 14 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:39264 HCAPLUS
DN 124:124601
TI Metalization of ceramics with active metal brazes
AU Satir-Kolorz, A.; Maus, O.
CS Dubendorf, Germany
SO DVS Ber. (1995), 166(Hart- und Hochtemperaturloeten und Diffusionsschweissen), 176-9
CODEN: DVSBA3; ISSN: 0418-9639
DT Journal
LA German
AB Two examples of the use of active metal brazes for metalizing ceramics are presented. In the 1st example, the successful development of a brazed joint between a sapphire window, precoated with active metal braze, and a Cu reflector is presented. Metalization of the sapphire was necessary as the metallic partner would not survive the high temp. of the active brazing process without damage. The 2nd example shows the benefit of prebrazing the Si3N4 ceramic components for high-temp.-resistant ceramic-ceramic joints in contrast to directly brazed joints. Directly brazed joints can only be used up to 600.degree., whereas prebrazed joints still have a strength of 85 **MPa** at 800.degree..

L24 ANSWER 15 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1993:217896 HCAPLUS
DN 118:217896
TI Sintered alloy tools for diamond dressing of ceramics
IN Rydl, Petr; Hofbauer, Miroslav
PA Czech.
SO Czech.
CODEN: CZXXA9
DT Patent
LA Czech
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CS 273693	B1	19910312	CS 1987-9974	19871228

PI
AB The dressing or polishing tools are manufd. by mixing of diamond powder with mixt. consisting of 25-40% WC and balance Fe, compacting the mixt. at 40-60 **MPa**, adding a **layer** of **metal** powders, compacting at 80-140 **MPa**, and impregnating the compact for 10-200 min at 800-1000.degree. with molten alloy contg. Cu 77.5, Sn 19, Co

3, and FeC 0.5%. The resulting sintered tools are suitable for dressing of ceramics.

L24 ANSWER 16 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1990:123482 HCAPLUS
DN 112:123482
TI Tribological characteristics of **metal coatings** deposited by surfacing, electric-arc, and plasma spraying
AU Netyagov, P. D.; Pogonyshev, V. A.; Samsonovich, E. N.; Antsifrov, G. D.
CS Bryansk. S-Kh. Inst., Bryansk, USSR
SO Trenie Iznos (1989), 10(5), 909-13
CODEN: TRIZD6; ISSN: 0202-4977
DT Journal
LA Russian
AB Sliding friction against steel 45 in tests at 1.31 m/s and 5 **MPa** or 2.62 m/s and 10 **MPa** was detd. for alloy and composite coatings 1.5-2 mm thick. The coating materials were: (a) bronze BrKMts3-1 or BrA7; (b) brass L63; and (c) composites from steel Sv08G2 and BrKMts3-1, Al bronze AMts3 and bronze BrKMts3-1, steel Sv08G2 and Al bronze AMts3, or Al bronze AMts3 and antifriction alloy B88. Surface hardness, microroughness, and wear loss were related to the spray coating or weld surfacing conditions. Low friction and wear loss were obsd. for the plasma-sprayed BrA7, as well as for the (AMts8 + B88) composite applied by elec.-arc spraying.

L24 ANSWER 17 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1989:62694 HCAPLUS
DN 110:62694
TI Formation of shaped inorganic foam and mold for its manufacture
IN Shiozawa, Shuko
PA Sekisui Plastics Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 63206368	A2	19880825	JP 1987-35738	19870220
	JP 05009242	B4	19930204		

AB A mixt. of aggregates, water glass, and a foaming agent is foamed and shaped in molds which have penetrating pores having diams. of 3.5 .ANG. to 10 .mu.m on the inner face of the molds. The aggregates is preferably SiO2, the foaming agent can be Al, Si, or ferrosilicon, and a hydrophilic releasing film can be used between the mold and the mixt. Thus, spherical gun-metal powder (av. size 25 .mu.m) was mixed with Me cellulose, pressed at 1 **MPa**, sintered at 785.degree. to form a plate having 10-.mu.m pores, and coated with a 5-.mu.m fine PTFE-powder layer to form a lid for a gun-**metal** mold **coated** with 5-.mu.m layer PTFE powder on its inside. A mixt. of water glass (contg. SiO2 29.1%), NaOH 8.5, water 50, SiO2 (200-325 mesh 56%, -325 mesh 44%) 300, Al(OH)3 (-300 mesh) 50, Al (32 .mu.m, coated with stearic acid) 3, and Si (-100 mesh), 15 g was filled in the mold, with porous Al2O3 plates attached at the bottom of the mold and the lower side of the lid for adjusting the vol. of the mold so that no voids were in the mold after foaming (the thickness of the plates was calcd. from a free foaming test), and heated at 70.degree. to obtain a foamed article. The articles of the invention can be used as thermal insulators, sound absorbers, building materials, etc.

L24 ANSWER 18 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1986:595660 HCAPLUS
DN 105:195660
TI Effect of copper electroplate on siliconizing of titanium alloys
AU Bodyako, M. N.; Shipko, A. A.; Shatyi, V. A.; Yaroshevich, G. B.; Tereshkova, S. G.
CS Fiz.-Tekh. Inst., Minsk, USSR
SO Vestsi Akad. Navuk BSSR, Ser. Fiz.-Tekh. Navuk (1986), (3), 24-30
CODEN: VABFAF; ISSN: 0002-3566
DT Journal
LA Russian
AB The effect of an intermediate Cu electroplate on siliconizing of Ti alloys VT6 [12743-70-3] and VT30 [**12741-53-6**] under conditions of rapid elec. heating with short-term isothermal holdings was studied. After siliconizing the preliminary Cu-electroplated alloys, the surface hardness increased by .apprx.20% compared to noncoated alloys. The thickness of the diffusion layer was .ltoreq.950 .mu. with uniform distribution of microhardness over the strengthened layer cross-section, the increased microhardness values (>5000 **MPa**) being maintained to the 650-700 .mu. thickness. Redn. of SiO2 and reaction of the obtained Si with the Cu-contg. intermetallic formed took place with subsequent displacement of Cu from the binary compds. The freed Si formed silicides with **metals**; in diffusion **layer**, they were Ti5Si3 and TiSi2. Using exptl. planning, the process parameters were optimized.

L24 ANSWER 19 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1984:75808 HCAPLUS
DN 100:75808
TI Out-reactor nodular corrosion behavior of Zircaloys
AU Ramasubramanian, N.
CS Chalk River Nucl. Lab., At. Energy Canada Ltd., Chalk River, ON, K0J 1J0, Can.
SO J. Nucl. Mater. (1983), 119(2-3), 208-18
CODEN: JNUMAM; ISSN: 0022-3115
DT Journal
LA English
AB The effect of sputtered films of Nichrome, stainless steels, and Pt on the oxidn. behavior of Zircaloy-2 [**11068-94-3**] and Zircaloy-4 [**11068-95-4**] in steam at 773 K and 10.5 **MPa** was investigated. The occurrence of nodular type accelerated oxidn., normally obsd. with regular uncoated samples, was reduced drastically in the case of sputter coated samples. The effect of sputtered films was similar to pre-oxidizing the alloy at <773 K to form a black adherent oxide 2-3 .mu.m in thickness. The formation of nodules is, however, not completely eliminated by either the sputtered films or the pre-oxidn. Characteristic x-ray anal. of nodules on uncoated samples revealed that the 2nd phase intermetallic ppts. in the bulk of the growing oxide are sites of nodule nucleation. H produced at these sites leads to stress generation and cracking of the protective oxide. The localized rapid oxidn. accompanying the cracking forms the nodules.

L24 ANSWER 20 OF 20 HCAPLUS COPYRIGHT 2002 ACS
AN 1983:130735 HCAPLUS
DN 98:130735
TI Soldering of metals with a protective coating. Volume 2
CS Institut de Soudure, Paris, Fr.
SO Report (1982), CETIM-12-Y-132-Vol-2, IS-12328-Vol-2, 67 pp. Avail.: NTIS From: Sci. Tech. Aerosp. Rep. 1982, 20(23), Abstr. No. N82-32755

DT Report
LA French
AB The influence of the protective coating, surface characteristics, and solder aging on the mech. characteristics of soldered joints was exptl. detd. using 9 types of protective layers, 2 types of surface, and 4 aging conditions. No substantial difference was found between types of protective coating. The av. bond strengths were 40-60 **MPa**.
Good surface wetting was obsd. for Sn, Sn-Pb, Ag, Au, and Au-Ni protective coatings.

L28 ANSWER 17 OF 17 HCAPLUS COPYRIGHT 2002 ACS
AN 1978:178874 HCAPLUS
DN 88:178874
TI Susceptibility of zirconium alloys to delayed hydrogen cracking
AU Coleman, C. E.; Ambler, J. F. R.
CS Metall. Eng. Branch, Chalk River Nucl. Lab., Chalk River, Ont., Can.
SO ASTM Spec. Tech. Publ. (1977), (STP 633, Zirconium Nucl. Ind.), 589-607
CODEN: ASTTA8; ISSN: 0066-0558
DT Journal
LA English
AB Smooth and notched cantilever beams and round-notched bars were machined from pressure tubes of cold-worked Zr-2.5Nb [50813-12-2] and Zircaloy-2 [**11068-94-3**]. They were loaded in the temp. range 290 to 520 K. After 2 thermal cycles and at high stress, cracks were initiated in smooth beams of cold-worked Zr-2.5Nb. Under the same test conditions, cold-worked Zircaloy-2 plastically deformed with no cracking. When notches were present, cracks propagated at the same rate in both materials by delayed H cracking. In cold-worked Zr-2.5Nb, the crack velocity followed an Arrhenius plot with an apparent activation energy of 42 kJ/mol. Below 420 K, the threshold stress intensity factor for delayed hydrogen cracking was .apprx.5 **MPa** .sqroot.m. Therefore, cracking can be prevented by keeping **tensile stresses** very low.

L30 ANSWER 1 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 2002:22309 HCAPLUS
DN 136:138026
TI A study on shortening of low temperature annealing time for phosphor bronze spring
AU Kawana, Takeshi; Abe, Hirohide
CS Department of Mechanical Engineering, Ishinomaki Senshu University, 1 Minamisakai Shimnito, Ishinomaki-shi, Miyagi, 986-8580, Japan
SO Nippon Kikai Gakkai Ronbunshu, C-hen (2001), 67(662), 3311-3316
CODEN: NKCHDB; ISSN: 0387-5024
PB Nippon Kikai Gakkai
DT Journal
LA Japanese
AB Low temp. annealing of a helical compression spring using phosphor bronze (C5191) fine wire is investigated, aiming at short time residual stress relief. In the processing of the coil spring, it is necessary to relieve the residual stress caused during wire deformation. However, the time for its heat treatment is very long, for example, 10 min to 2 h. To change this condition, the residual stress relief rate is formulated under the assumption that this stress relief process is equal to stress relaxation in creep. This is because the both are caused by recovery of **metal** crystals before recrystn., as explained by dislocation theory. Next, the consts. of formula are detd. through the expts., measuring isothermal change of the uniform **tensile stress**. Utilizing the formula, the short time condition for annealing is found. As the result, in-line coiling, annealing, and assembling is made possible.

L30 ANSWER 2 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:657724 HCAPLUS
DN 135:203978
TI Chip-size semiconductor packages with good strength against external stress and their manufacture
IN Morozumi, Yukio
PA Seiko Epson Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001244287	A2	20010907	JP 2000-55864	20000301

AB The process comprises these steps; forming wiring layers (A) on the outermost wiring pads, mounting ball-shaped **metal** posts on A, sealing the whole chips with resins and exposing a part of the posts, and forming terminals on the bare post surfaces. The terminal materials should have lower m.p. than that of the posts. Both the terminals and the posts may be solders and may have high-m.p. cores for shape stabilization. This package structures promise excellent strength and low manufg. cost.

L30 ANSWER 3 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:628850 HCAPLUS
DN 135:229767
TI Improvement of internal quality by controlling the microstructure of microalloyed cast steel
AU Harste, K.; Weisgerber, B.; Tacke, K.-H.; Gnauk, J.; Bobadilla, M.; Lovato, G.; Crocenzo, M.; Haetoenen, T.

CS AG der Dillinger Huettenwerke, Dillingen, D-66748, Germany
SO European Commission, [Report] EUR (2001), EUR 19491, 1-178
CODEN: CECED9; ISSN: 1018-5593
DT Report
LA English
AB The objective of the project is to investigate the parameters which control the development of the solidification structure and to find the optimum casting parameters to achieve low segregation and high cleanliness of steel. For this purpose the knowledge of fundamental research work on the solidification of ferrous and non-ferrous materials was systematically investigated: Numerical modeling predicting the evolution of microstructure in continuous casting of steel supports the minimization of segregation and internal defects related to microstructure. Therefore, in an iterative manner, the existing numerical modeling was enhanced in a sequence of steps in parallel to machine measurements performed by the industrial partners. Industrial investigations and numerical modeling were supported by fundamental research in lab. scale in the fields of rheol. and simulation of solidification structure and segregation formation. The effect of casting parameters such as secondary cooling intensity, superheat, mold electro-magnetic stirring (MEMS) and casting speed on the microscopic and macroscopic features of the solidification structure of different steel grades was investigated in industrial trials at the bloom caster of Imatra Steel Oy (IMATRA) and at the slab casters of Dillinger Huettenwerke (DH). Thus the primary and secondary dendrite arm spacing, the transition from columnar to equiaxed solidification (CET), center segregation, microsegregation as well as phase distribution, cleanliness and microporosity were measured. The considered steel grades are microalloyed steel grades including addns. of titanium and vanadium to investigate the effect of pptns. on microstructure, a medium carbon steel grade contg. higher amts. of sulfur to evaluate the influence of elements affecting the surface tension, medium carbon steel grades alloyed with chromium and molybdenum, medium carbon steel without any considerable alloying element addns. and high carbon steel grades contg. mass contents of .apprx.0.47 and 0.56% C to take into account the primary solidification phases .delta.-ferrite and austenite. Many basic research was done using high carbon steel because the solidification and microstructure of high carbon steel grades is much easier to develop and evaluate than the structure of microalloyed steels. In industrial trials at IMATRA the mold EMS has a dominant effect on the solidifying structure and the transversal segregation profile. If mold EMS is applied, as done in the case of bloom casting, the effects of the other parameters are almost totally masked by the EMS. Only if mold EMS is not applied, as done in the case of slab casting, some influence of casting parameters on microscopic or macroscopic features was obsd. Although the applied variations of casting conditions were big enough to show some general effects, they are too small to impact the structure significantly. If considerable improvement of one feature should be reached, the casting conditions must be changed in ranges which would probably cause neg. effects on other quality aspects such as surface quality or castability. The extent of the equiaxed center region is the only parameter which can be controlled effectively by a casting parameter which is superheat. At low superheat values there is a rapid increase of columnar zone with increasing superheat. Any other investigated feature is mainly effected by chem. compn. than by the variation of casting conditions. So, microsegregation of Mn is generally stronger than microsegregation of Si due to the smaller diffusion of Mn in the solid phase. The microsegregation of both Mn and Si is significantly higher in the equiaxed zone than in the columnar zone caused by better opportunities for solute rejection within equiaxed mushy zone offering a relatively large residual melt reservoir. This effect is added to

macrosegregation showing max. concns. of solutes in the center region of the as-cast product. It was found that center segregation slightly increases with increasing superheat or intensified secondary cooling intensity. Parallel, higher microsegregation was obsd. in the center region in the case of intensive cooling compared to normal cooling as well as with increasing super-heat in tundish. Between columnar crystals, microsegregation could not be influenced by secondary cooling intensity. Besides, there is no clear effect of superheat on microsegregation in the columnar zone. Considering the primary solidification phase the Mn microsegregation is marginally lower if the primary solidification phase is austenite than if it is .delta.-ferrite whereas the opposite effect was found in the case of Si. The contradiction is explained by the different equil. distribution coeffs. The secondary dendrite arm spacing is reported to depend on the sampling positions along slab width because of the deflection of primary arms by stream flow. An influence of superheat was not obsd. whereas the influence of secondary cooling and of chem. compn. was noticed. The secondary dendrite arm spacing can slightly be reduced by intensive secondary cooling. The influence of cooling conditions is better reflected considering the solidification variables which were calcd. on the basis of the soln. of the enthalpy balance equation. Exptl. data of dendrite morphol. obsd. in slabs were related to calcd. solidification variables such as cooling rate, solidification time, temp. gradient and solidification rate. Thus, an expression for the dependence of secondary dendrite arm spacing on solidification variables can be proposed for columnar growth of continuously cast slabs. Microalloyed steel grades were compared to non-alloyed steel contg. similar carbon content. The microalloying elements Ti and V revealed no clear influence on secondary dendrite arm spacing. Besides, the effect of sulfur on microstructure was tested, too. Within the ranges of std. deviation sulfur slightly increases the secondary dendrite arm spacing. The reason is probably the reduced surface tension of the melt which is supposed to promote the redistribution of matter within the liq.-solid zone during solidification leading to stronger coarsening of secondary dendrite arms. The effect of increasing carbon content causing wider secondary dendrite arm spacing is also explained by the support of redistribution of matter within the two-phase zone because the solidification range is enlarged by increasing carbon content. The secondary dendrite arm spacing is given as function of solidification variables and carbon content. Besides, the larger secondary dendrite arm spacing of high carbon steel primarily solidifying as austenite compared to high carbon steel primarily solidifying as .delta.-ferrite is explained by the smaller boundary surface energy between liq. phase and .delta.-phase than between liq. phase and austenite. Hence, the tendency for ripening and consequently the secondary dendrite arm spacing is smaller for .delta.-ferrite than for austenite. The correlation of microsegregation and secondary dendrite arm spacing shows that there is an optimum secondary dendrite arm spacing corresponding to an optimum solidification time which causes minimal microsegregation. Since solidification conditions vary from surface toward slab center, it is not possible to extent this optimum combination to a wider range of slab thickness. The optimum solidification time is approx. 270s - 536s in the case of 0.56 wt.-% C steel and 445s - 830s in the case of 0.47wt.-% C steel. The columnar to equiaxed transition (CET) is effected by superheat and secondary cooling intensity. The length of columnar zone increases with increasing superheat since the higher the melt is superheated the longer it takes to reach the temp. necessary for unconstrained growth. The columnar zone is longer if intensive cooling was applied because the solidification front proceeds faster inside the melt before equiaxed nucleation and growth start. The influence of primary solidification

phase is related to surface energy between solid and liq. phase. Since .delta.-ferrite has better thermodn. resistance due to the smaller surface energy between .delta.-ferrite and melt than austenite, a larger no. of equiaxed crystals can form, consequently reducing the columnar zone. The influence of carbon content is limited to the influence of primary solidification phase which is mainly detd. by carbon. Addns. of microalloying elements or of sulfur in medium carbon steels support the growth of columnar zone. This means that there is no nucleation effect of ppts. or inclusions on equiaxed crystals growth. The macrosegregation is only slightly influenced by casting parameters. The macrosegregation was evaluated by image anal. and expressed in the term of the segregation value which is the product of mean segregation .times. max. segregation detd. in the tested image. The segregation value shows a small increase with increasing super-heat and with intensified secondary cooling. The worse segregation is related to increasing length of columnar zone because enriched melt which is sucked into the center region by bulging or vol. shrinkage distributes within a smaller vol. of remaining liq. Cleanliness as well as microporosity were tested within this project (1). But no. and size of inclusions could not be influenced by variation of secondary cooling intensity or superheat. The distribution of microscopic shrink holes is detd. by dendrite arm spacing. Actually, there are two opposite effects of secondary dendrite arm spacing on the distribution of shrink holes. Firstly, the wider dendrite arm spacing is the bigger is the vol. between single dendrite arms. Within this vol. liq. sepn. and vol. shrinkage occur. The larger the vol. is the higher is the probability for the formation of shrink holes. Hence, the no. and size of shrink holes increases with increasing dendrite arm spacing. Secondly, the wider dendrite arm spacing is the wider are the channels between the single dendrites. Through these channels cavities are filled with liq. Thus, the no. and size of shrink holes decrease with increasing dendrite arm spacing. The contradiction of both tendencies is reflected by a max. in total no. of shrink holes at about a quarter of slab thickness. The shrink. hole formation is also detd. by carbon content because rising carbon content causes larger solidification ranges. Therefore, the mushy zone is bigger and the filling of interdendritic space through channels is impeded. Consequently, more shrink holes form in the case of steel grades contg. higher carbon contents. To optimize the internal quality of the cast product lab. studies were performed besides industrial trials. The aim of the research carried out at IRSID was to understand the mechanisms and to quantify the successive steps which take place during the solidification of the central equiaxed zone of the continuous casting of carbon steel products. The effects of forced liq. convection on the growth of equiaxed crystals in steels were analyzed exptl. and microstructural investigations, using a texture analyzer and a macroprobe analyzer, were made to quantify the morphol. of crystals and the segregation resp. To understand the formation of internal defects (internal cracks, macrosegregation) in continuously cast products, the theol. behavior of low m.p. Pb-**Sn alloys** between solidus and liquidus was analyzed by using mech. drawing tests. Lab. expts. were performed to simulate the formation of centerline segregation and V-segregation. From this, the potential effect of solidification shrinkage on segregation formation was estd. depending on the superheat. The effects of the forced liq. convection on the equiaxed growth were simulated by using, during the solidification, a mech. stirrer to promote the forced convection. In our configuration, twenty kilograms of carbon steel are melted inside an induction furnace and a cylindrical cooled stirrer is introduced. During the rotation of the stirrer, a solidified skin is formed around the stirrer and equiaxed crystals appear in the liq. region. The seeding effect was analyzed, for different rates of rotation

of the stirrer, by taking samples in the mushy zone during the cooling of the equiaxed zone. Two steels with different carbon contents, 0.3 wt.-% and 0.8 wt.-% were studied. The seeding effect of the crystals in the melt during stirring is the result of the erosion of the columnar dendrites. There is an optimal velocity of the liq. **metal** which contributes to a large seeding of crystals inside the liq. **metal** . The measurements of the compn. in the core of the crystals and in the quenched liq. surrounding of the crystals indicate that, during the stirring, the growth of equiaxed crystals occurs close to the equil. To analyze the formation of the internal defects which occur during the solidification when the mushy zone is under **tensile stress**, it is necessary to describe the theol. behavior of the mushy zone. A numerical model, taking into account the compressibility of the solid skeleton and the effect of the interstitial pressure due to the liq., was developed. To validate this model, extrusion tests in Sn-Pb alloys were performed at const. strain rate (id. punch velocity), in the range of 0.02 to 0.5 mm/s, with measurement of piston displacement and resulting extrusion strength. In the range of 0.66 to 0.85 solid fraction, the coeffs. of the compressive law for the mushy zone of Sn-Pb alloys are the following: Kf=0.68 and af=3.06. The theol. behavior of the steels in the mushy zone depends on the liq. fraction and on the morphol. of the microstructure (globular grains or dendritic grains). For the same morphol. of the microstructure and a similar size, the theol. behavior of the steels in the mushy zone can be identified, as a rough approxn., to the behavior of the Sn-Pb alloys, except near the eutectic temp. So the coeff. of the compressibility detd. in this work can be used, but it is necessary to modify the values of the consistency vs. temp. In the first approxn. it is also possible to use 0.2 for the value of the parameter sensitive to the deformation rate. An exptl. set-up was developed at IRSID to simulate the formation of centerline and V-segregation. The objective of this work was to analyze the effect of solidification. shrinkage on segregation formation. In our expt., liq. **metal** is cast inside an "I"-shape mold. In this configuration a vertical flow of mushy matter occurs along the axial direction under the effect of the shrinkage of the **metal** which solidifies in the lower part of the mold. At low superheat, the size of the equiaxed crystals is smaller than the one at high superheat. The size of the equiaxed zone is larger as the superheat decreases. Similar characterization are reported by others authors. By using a microsegregation model we have calcd., from the compns. measured inside V-segregated, an order of magnitude of the solid fraction at which the V-segregation appears. The solid fraction at which the V-segregation appears is in the range of 0.53 to 0.74. From these exptl. results, we can conclude that: a large extent of the equiaxed zone (i.e. a low superheat) favors V-segregation but decreases axial segregation, the V-segregation appears in a range of solid fraction of 0.53 to 0.74. This range depends on the value of the superheat. MPI has developed a numerical model for the selection of solidification morphol. and for the formation of phases during continuous casting of steel. The model is based on the generalized enthalpy method, which is extended to non-equil. conditions for the pptn. of solid phases. Three phases can be jointly handled, liq., .delta. and .gamma. and thus the peritectic transformation. Kinetic coeffs. were estd. by comparing exptl. and numerical data. The transition from columnar to equiaxed is described as. the result of a competition between these growth morphologies. The d. of nuclei has to be prescribed as an input parameter, which can be obtained from measured equiaxed grain diams. The model was used to study the effect of process parameters. Computation series were performed for the conditions of the expts. reported by P. Stadler. For a 0.6 % C-steel, the length of the columnar range was reproduced as a function of superheat.

The effect of surface heat removal on the formation of the equiaxed range was studied. Reducing surface heat transfer promotes equiaxed structures, which was found both from computations and lab. expts. As a link to the work done by IRSID in this project, the nucleation d. has. been varied and the effect on the columnar length was obtained. The d. of nuclei is a parameter with a strong effect on CET, as the computations have demonstrated. When combining the results by IRSID and MPI the effects of the stirring intensity on CET can be rationalized, which is interesting for electromagnetic stirring. MPI's model was applied to the slab caster at Dillinger Huettenwerke. A d. of nuclei was used which is in accord with obsd. equiaxed grain densities. The computed CET curves coincide with the measurements performed by DH in this project. Parameter variations have confirmed that the superheat is the parameter with the largest influence on CET. Intensive cooling increases the columnar range, roughly by .apprx.10 mm in this case at superheats of around 30 K. The casting speed was varied, but seems to have little effect on the equiaxed and columnar ranges. The results of IMATRA trials were used to develop a math. model package to simulate austenite decompn. and microstructure formation in as-cast blooms and austenitized and hot rolled billets. The simulations were validated with exptl. data from continuously cast strands of Imatra Steel where the package was used to study the effects of individual casting parameters on the phase distribution on the cross section of the bloom. The package was developed in this project as a subcontracted work at Lab. of Metallurgy, in Helsinki University of Technol. (HUT). At HUT, three model packages had been developed to simulate macroscopic heat transfer in the strand (TEMPSIMU), phase transformations and solute redistribution during the solidification process (IDS) and phase transformations during the austenite decompn. process (ADC). During this project, a new model package (SAC) was developed and applied with the earlier developed packages to simulate austenite decompn. and microstructure formation.

With this model combination, it is possible to simulate the whole casting process so that the results are directly related to the applied casting variables (e.g., casting speed, superheat and mold & secondary cooling intensity) and the strand geometry. The coupled calcns. can be used to optimize a safe combination of model input parameters (steel compn., casting variables and strand geometry) which results in a favorable, uniform phase distribution in the CC strand and, thus, in a better quality of the product. The simulations were validated with exptl. data of strand surface temp., microstructure, phase fraction and hardness, measured from continuously cast strands of Imatra Steel. These strands contained .apprx.0.4wt.-% C, 0.25wt.-% Si, 0.9wt.-% Mn, 1 wt.-% Cr, 0.25 wt.-% Mo and 0.2 wt.-% Ni. Both as-cast blooms and hot-rolled billets were studied. In the case of as-cast blooms, the calcns. yielded a uniform phase distribution of proeutectoid ferrite (.apprxeq.2%), bainite (.apprxeq.85%) and martensite (.apprxeq.13%) through the strand. This correlates reasonably well with the exptl. measurements. Increasing the casting speed from 0.55 m/min to 0.87 m/min or the cooling intensity with a half from the original, did not have a noticeable effect on the results. In the case of hot-rolled billets, the calcns. yielded a uniform phase distribution of bainite (.apprxeq.97%) and martensite (.apprxeq.3%) through the strand. Also these results correlate well with the exptl. measurements. In both cases, the uniform phase distributions can be explained by the uniform compn. profiles (minimal macrosegregation) and the almost const.-value cooling rates through the strand. Finally, two test calcns. were carried out to show sensitivity of the cooling rate and compn. on the results. Very slight changes in these data lead to the formation of pearlite in as-cast blooms and proeutectoid ferrite in hot-rolled billets, causing a non-favorable phase distribution in the

strand.
RE.CNT 149 THERE ARE 149 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L30 ANSWER 4 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:116163 HCAPLUS
DN 134:211166
TI Numerical modeling of delayed hydride cracking in zirconium alloys
AU Varias, A. G.; Massih, A. R.
CS Solid Mechanics Research Office, Athens, 141 21, Greece
SO Advances in Mechanical Behaviour, Plasticity and Damage, Proceedings, Tours, France, Nov. 7-9, 2000 (2000), Volume 2, 1219-1224. Editor(s): Miannay, Dominique. Publisher: Elsevier Science Ltd., Oxford, UK. CODEN: 69AYFC
DT Conference
LA English
AB A math. model for the H embrittlement and fracture of hydride forming **metals** is presented. The model takes into account the coupling of the operating phys. processes of H diffusion, hydride pptn., non-mech. energy flow, hydride/solid-soln. deformation, and fracture. A finite element implementation of the model is used for the simulation of Zircaloy-2 H embrittlement and delayed hydride cracking initiation. Two cases are discussed: (i) a boundary layer problem of a semi-infinite crack, under mode I loading and const. temp., and (ii) a cracked plate, under **tensile stress** and temp. gradient. The initial and boundary conditions in case (ii) are those encountered in the fuel cladding of light water reactors, during operation. The numerical simulation predicts hydride pptn. at a small distance from the crack tip. When the remote loading is sufficient, the near tip hydrides fracture. Thus a microcrack is generated, which is sepd. from the main crack by a ductile ligament, in agreement with exptl. observations.
RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L30 ANSWER 5 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:410256 HCAPLUS
DN 133:108339
TI Microstructure of oxide layers formed on Zircaloy-2 in air at 450.degree.
AU Ishii, Y.; Sykes, J. M.
CS Department of Materials, University of Oxford, Oxford, OX1 3PH, UK
SO Materials at High Temperatures (2000), 17(1), 23-28 CODEN: MHTEEM; ISSN: 0960-3409
PB Science and Technology Letters
DT Journal
LA English
AB Oxidn. tests were conducted at 450.degree. in air on Zircaloy-2 and modified alloys. Breakaway oxidn. occurred. Microstructure of the oxide films was examd. by using TEM. Cross sections were prepd. from specimens having various thicknesses of oxide by using ion beam thinning. The oxide structure was mainly columnar in both the pre- and post-transition oxides, but a heavily twinned structure was obsd. in the post-transition oxide. At the **metal**/oxide interface, .omega.-Zr was obsd. in the **metal** beneath the oxide in both the pre- and post-transition specimens. The high-pressure .omega.-phase may be evidence of compressive rather than **tensile stress** close to the interface.
Two types of the intermetallic ppts. were obsd. (1) Zr-Fe-Cr type (2) Zr-Fe-Ni type. The former type ppts. survived unoxidized in the oxide near the **metal**/oxide interface, but disappeared further away from the interface. No Zr-Fe-Ni type ppts. were obsd. in the oxide.

Tensile stresses from expansion during progressive oxidn. of the Zr-Fe-Cr type intermetallic particles embedded in the oxide may be the cause of the breakaway in air.

RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L30 ANSWER 6 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1998:357342 HCAPLUS
DN 129:114599
TI Modeling of the mechanical behavior of the **metal**-oxide system during Zr alloy oxidation
AU Parise, M.; Sicardy, O.; Cailletaud, G.
CS Ecole Nationale Superieure des Mines de Paris, Centre des Materiaux Pierre-Marie Fourt, B.P. 87, CNRS URA 866, Evry, 91003, Fr.
SO Journal of Nuclear Materials (1998), 256(1), 35-46
CODEN: JNUMAM; ISSN: 0022-3115
PB Elsevier Science B.V.
DT Journal
LA English
AB During the oxidn. of Zircaloy fuel cladding, large stresses develop in the oxide layer. This paper presents two approaches to evaluate the stresses in the **metal**, modeled as a viscoplastic material, and the oxide, considered as elastic transverse isotropic. The first approach is a computation of the stresses in the whole cladding on a 1-dimensional radial geometry. It evidences large compressive hoop stresses in the oxide and weak **tensile stresses** in the **metal** . The second approach is a 2-dimensional finite elements computation accounting for the undulation of the **metal**-oxide interface. This specific geometry is found to have an important influence on the local stress state. In particular, radial stresses are evidenced near the **metal**-oxide interface, whose sign and value depend on the local curvature of the interface.

L30 ANSWER 7 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:638245 HCAPLUS
DN 127:321529
TI The effect of interfacial strength on the response of Ti MMCs to single fiber push-out and transverse tensile testing
AU Kalton, A. F.; Miracle, D. B.; Clyne, T. W.
CS Dep. Materials Science Metallurgy, Cambridge Univ., Cambridge, CB2 3QZ, UK
SO Key Engineering Materials (1997), 127-131(Pt. 1, Ceramic and Metal Matrix Composites, Pt. 1), 659-669
CODEN: KEMAEY; ISSN: 1013-9826
PB Trans Tech
DT Journal
LA English
AB Ti-based monofilament-reinforced composites were subjected to single fiber tensioned push-out testing and to transverse tensile testing, at ambient and elevated temps. Single fiber push-out testing, with and without superimposed in-plane tension, was applied to Ti-6Al-4V/SM1240 composites in the as-received state. These tests indicate that, while normal debonding probably occurs under small **tensile stresses** , resistance to shear displacement at the interface remains significant even when the normal stress becomes tensile. Transverse tensile testing, using a novel cruciform test geometry, was carried out on Ti-6242/SM1240 composites, in both as-received and heat treated states, at room temp. and at 482.degree.. The heat treatment, which had little apparent effect on the interfacial microstructure, reduced both strength and ductility, at both testing temps. Testing at high temp. increased the ductility of both

materials. Poisson ratio monitoring during the room temp. testing indicated that a degree of interfacial debonding occurred during transverse loading of the as-received composite, but failure occurred in heat treated material before this type of damage became significant. Comparisons were made between obsd. stress-strain plots and those predicted by FEM modeling, taking account of thermal residual stresses and treating the interface either as perfectly bonded or as obeying a Coulomb frictional sliding law, effectively assuming that the interface becomes completely debonded if the normal stress becomes tensile. The predicted plots for the weakly bonded interface showed early departure from elastic behavior, as debonding occurred, and subsequent extensive matrix plasticity as a consequence of the assocd. relaxation of constraint. The comparisons suggest that interfacial debonding did indeed occur in the as-received composites, although to a lesser extent than predicted by the FEM modeling for a simple Coulomb law. This is consistent with the results from the tensioned push-out testing, which indicated that the interface continues to offer resistance to shear displacements even when the normal stress is tensile, since the extensive debonding predicted by the FEM modeling involves a considerable degree of such shear displacement. The behavior of the heat treated material was interpreted as involving little change in interfacial characteristics as such, but the matrix was embrittled by the heat treatment, making it less tolerant of microcracking in the coating layers.

L30 ANSWER 8 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:85256 HCAPLUS
DN 126:134360
TI Magnitude of the specific fracture energy in certain **metals** and alloys at thermal impact
AU Molitvin, A. M.; Borin, i P.; Bosamykin, V. S.
CS Vserossiisk Nauchno-Issled. Inst. Eksp. Fiz., Sarov, Russia
SO Problemy Prochnosti (1996), (6), 27-32
CODEN: PPCNBG; ISSN: 0556-171X
PB Institut Problem Prochnosti AN Ukrainy
DT Journal
LA Russian
AB The series of assessing calcns. for magnitude of crit. specific energy of fracture, .lambda.*, is conducted. The calcns. are conducted in frameworks of energetic approach. The specific energy is used up by flat specimens on fracture and fragmentation work in submicrosecond range of durability. These specimens were subjected to action of the short-term x-ray radiation impulses arising in a nuclear explosion. The thickness of specimens changed over the range from 0,01 mm to 1 mm. The evaluations have shown that the crit. specific energy, .lambda.*, is not a material const. and depends on the loading conditions. It grows with an increase in duration of **tensile stress** action in torn cross-sections.

L30 ANSWER 9 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:652882 HCAPLUS
DN 126:63396
TI Numerical simulation of the solidification of zinc die castings
AU Klein, F.; Pokora, E.; Dul, J.
CS Fachhochschule Aalen, Aalen, D-73430, Germany
SO Materials Science Forum (1996), 215-216(Solidification and Gravity), 415-422
CODEN: MSFOEP; ISSN: 0255-5476
PB Trans Tech
DT Journal

LA English
AB Solns. about the distributions of temps. during hot-chamber die casting calcd. with the program system CAST SIMTEC are compared with measured values of die casting of ZnAl4Cu1 with different initial conditions. Higher temps. of the die, without using an outer cooling system, decreased the productivity. The parts of the overheated die and the **tensile stresses** occurred in the overheated places caused by badly designed outer cooling system are detd. by the results of the simulation.

L30 ANSWER 10 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:441735 HCAPLUS
DN 125:92906
TI Evaluation of thermal fatigue property for aluminum alloy castings
AU Ikuno, Hajime; Iwanaga, Shogo; Awano, Yoji
CS Toyota Chuo Kenkyusho, Japan
SO Toyota Chuo Kenkyusho R&D Rebyu (1996), 31(2), 73-84
CODEN: TCKRDN; ISSN: 0385-1508
DT Journal
LA Japanese
AB A new test method for evaluating the thermal fatigue resistance of aluminum alloys was developed. In this method, a small test piece was clamped between a pair of holders consisting of a low-thermal expansion material. The test piece was alternately heated and cooled with the longitudinal thermal expansion constrained. Temp. distribution of the test piece was within 5K. The total strain range was kept almost const. during the test. Thermal stress-strain behavior was quant. estd. using high-temp. strain gages. By applying this test method to JIS-AC2B-T6 aluminum alloy castings, the fracture behavior and the effect of porosity on the thermal fatigue lives were studied. The obtained results are as follows: The max. **tensile stress** at the lowest temp. decreased rapidly with fast crack propagation and then the fracture occurred; it was quant. clarified by using this test method that decreasing total strain range and reducing porosity increased thermal fatigue lives of the alloy castings; the fracture mechanism was changed by the total strain range, affecting the correlation between the porosity and the thermal fatigue lives.

L30 ANSWER 11 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1995:700132 HCAPLUS
DN 123:239778
TI How the tetragonal zirconia is stabilized in the oxide scale that is formed on a zirconium alloy corroded at 400.degree. in steam
AU Godlewski, Joel
CS DTA-CEREM-DECM-SRMA, Commissariat l'Energie Atomique (CEA), Gif-sur-Yvette, 91191, Fr.
SO ASTM Spec. Tech. Publ. (1994), STP 1245(Zirconium in the Nuclear Industry: Tenth International Symposium, 1993), 663-83
CODEN: ASTTA8; ISSN: 0066-0558
DT Journal
LA English
AB Zircaloy-4, in 3 different metallurgical forms (stress relieved, recrystd., and .beta.-quenched), was oxidized at 400.degree., in steam, up to 95 days. For each sample, the fraction of tetragonal zirconia was measured by x-ray diffraction and Raman spectroscopy. These 2 techniques show several zones contg. tetragonal zirconia: a zone rich in the oxide near the **metal**-oxide interface and an other zones with lower concns. in the rest of the pre-transition layers. For the post-transition samples, the external sublayer contains only a small amt. of tetragonal zirconia. Measurements of residual stresses by x-ray diffraction in the

metal underlying the oxide show that the **metal** is under **tensile stress** state and that the stress values very with oxidn. duration. The level of the stress depends on the metallurgical form of the initial **metal**. The low penetration of x-rays in the material also made it possible to show a very high stress gradient near the **metal**-oxide interface that can explain the high proportion of tetragonal zirconia near the interface. The study of the incorporation of intermetallic ppts. in the oxide and their chem. changes was carried out by electron microprobe anal. on taper cross sections of the oxide. This technique makes it possible to perform a large no. of point analyses that yield satisfactory statistics for the variation in the Fe/Cr (Fe/Cr) atom ratio of the ppts. in the oxide. The intermetallic ppts. are incorporated into the oxide layer and then undergo a chem. change starting at a particular distance from the **metal** /oxide interface. The characteristic values of the Fe/Cr ratio before oxidn. (1.6 for stress relieved and recrystd. conditions and 0.8 for .beta.-quenched samples) are progressively spread out during oxidn. This change could correspond to an oxidn. of intermetallic ppts. with segregations of Fe at the ppt.-oxide interface, as shown in the literature. The oxidn. of the ppts. is accompanied by a vol. change that should give a stress field around the ppts. and could stabilize the neighboring tetragonal phase. When the ppts. are completely oxidized, the stress field disappears and there is a transformation of the tetragonal phase to a monoclinic form, leading to the kinetic transition. Stress relaxation is shown by a decrease of the **tensile stresses** in the **metal** underlying the oxide that is undergoing kinetic transition.

L30 ANSWER 12 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1995:700127 HCAPLUS
DN 123:239826
TI Grain-by-grain study of the mechanisms of crack propagation during iodine stress corrosion cracking of Zircaloy-4
AU Haddad, Roberto E.; Dorado, Alberto O.
CS CNEA (Gcia. de Desarrollo), Buenos Aires, 1429, Argent.
SO ASTM Spec. Tech. Publ. (1994), STP 1245(Zirconium in the Nuclear Industry: Tenth International Symposium, 1993), 559-75
CODEN: ASTTA8; ISSN: 0066-0558
DT Journal
LA English
AB The tests were conducted to det. the conditions leading to cracking of a specified grain of **metal**, during the I stress corrosion cracking (SCC) of Zr alloys, focusing on the crystallog. orientation of crack paths, the crit. stress conditions, and the significance of the fractog. features encountered. To perform cryst. orientation of fracture surfaces, a specially heat-treated Zircaloy-4 having very large grains, grown up to the wall thickness, was used. Careful orientation work proved that intra-cryst. pseudo-cleavage occurs only along basal planes. The effects of anisotropy, plasticity, triaxiality, and residual stresses originated in thermal contraction have to be considered to account for the influence of the stress state. A grain-by-grain calcn. indicated that transgranular cracking always takes place on those bearing the max. resolved **tensile stress** perpendicular to basal planes.
Propagation along twin boundaries was identified among the different fracture modes encountered.

L30 ANSWER 13 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1995:700112 HCAPLUS
DN 123:239816

TI Mitigation of harmful effects of welds in zirconium alloy components
AU Coleman, Christopher E.; Doubt, George L.; Fong, Randy W. L.; Root, John H.; Bowden, John W.; Sagat, Stefan; Webster, R. Terrence
CS AECL Research, Atomic Energy Canada Ltd., Chalk River, ON, KOJ 1JO, Can.
SO ASTM Spec. Tech. Publ. (1994), STP 1245(Zirconium in the Nuclear Industry: Tenth International Symposium, 1993), 264-84
CODEN: ASTTA8; ISSN: 0066-0558
DT Journal
LA English
AB Welding produces local residual **tensile stresses** and changes in texture in components made from Zr alloys. In the heat-affected zone in tubes or plates, the basal plane normals are rotated into the plane of the component and perpendicular to the direction of the weld. Thin-walled Zircaloy-2 tubes contg. an axial weld do not reach their full strength because they always fail prematurely in the weld when pressurized to failure in a fixed-end burst test. Reinforcing the weld by increasing its thickness by 25% moves the failure to the parent **metal** and improves the biaxial strength of the tube by 20 to 25% and increases the total elongation by 200 to 450%. In components made from Zr-2.5Nb, the texture in the heat-affected zone promotes delayed hydride cracking driven by tensile residual stress. Although the texture is not much affected by heat-treatments <630.degree. and large grain interaction stresses remain as a result of mixed textures, macro-residual **tensile stresses** can be relieved by heat treatment to the point where the probability of cracking is very low.

L30 ANSWER 14 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1994:705959 HCAPLUS
DN 121:305959
TI Mitigation of harmful effects of welds in zirconium alloy components
AU Coleman, C. E.; Doubt, G. L.; Fong, R. W. L.; Root, J. H.; Bowden, J. W.; Sagat, S.; Webster, R. T.
CS AECL Research, Chalk River Laboratories, Chalk River, ON, KOJ 1JO, Can.
SO At. Energy Can. Ltd., [Rep.] AECL (1993), AECL-10950, 25 pp.
CODEN: AECRAN; ISSN: 0067-0367
DT Report
LA English
AB Welding produces local residual **tensile stresses** and changes in texture in components made from zirconium alloys. In the heat-affected zone in tubes or plates, the basal plane normals are rotated into the plane of the component and perpendicular to the direction of the weld. Thin-walled Zircaloy-2 tubes contg. an axial weld do not reach their full strength, because they always fail prematurely in the weld when pressurized to failure in a fixed-end burst test. Reinforcing the weld by increasing its thickness by 25% moves the failure to the parent **metal**, improves the biaxial strength of the tube by 20 to 25%, and increases the total elongation by 200 to 450%. In components made from Zr-2.5Nb, the texture in the heat-affected zone promotes delayed hydride cracking (DHC) driven by tensile residual stress. Although the texture is not much affected by heat-treatments below 630.degree.C and large grain interaction stresses remain as a result of mixed textures, macro-residual **tensile stresses** can be relieved by heat-treatment to the point where the probability of cracking is very low.

L30 ANSWER 15 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1994:114065 HCAPLUS
DN 120:114065
TI Asymmetric hot isostatic pressing for manufacture of filament-reinforced ring-shaped articles

PA General Electric Co., USA
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 05287409	A2	19931102	JP 1992-285779	19921023
	US 5271776	A	19931221	US 1992-842685	19920227
PRAI	US 1992-842685		19920227		

AB The articles are manufd. by placing a ring multilayer-strengthened with unstressed filaments in a hot isostatic pressing cavity having outer wall with higher strength and inner wall with lower strength, and hot isostatic pressing to produce an asym. compression, resulting in a **tensile stress** on the filaments and a compressive stress on the **metal** matrix. The matrix **metal** is selected from Ti3Al, TiAl, Ti-6242, Ti-64, and Ti 1421 alloys; and the filament is preferably SiC filament. The filaments are embedded in a matrix **metal** without subjecting to stress by applying the matrix **metal** to the filaments through plasma spraying.

L30 ANSWER 16 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1993:522784 HCAPLUS
DN 119:122784
TI Diffusion-controlled decohesion using copper-**tin alloy** as a model system
AU Bika, Dafni; McMahon, Charles J., Jr.
CS Dep. Mater. Sci. Eng., Univ. Pennsylvania, Philadelphia, PA, USA
SO Mater. Res. Soc. Symp. Proc. (1992), 238(Structure and Properties of Interfaces in Materials), 399-404
CODEN: MRSPDH; ISSN: 0272-9172
DT Journal
LA English
AB This research deals with a mode of brittle intergranular fracture in which a surface-adsorbed embrittling element is driven into a grain boundary as a result of the application of a **tensile stress** across the boundary. A Cu-8% **Sn alloy** was employed to explore this phenomenon, since tin is a surface-active element and this alloy is known to suffer intergranular weakness at elevated temps. Intergranular cracking occurred by brittle, discontinuous crack advance at 265.degree. in vacuum with an av. rate of 0.1 .mu.m/s. This behavior is analogous to sulfur-induced stress-relief cracking in steels and several cases of liq.-**metal** embrittlement, suggesting that this phenomenon has a generic nature.

L30 ANSWER 17 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1989:558552 HCAPLUS
DN 111:158552
TI TEM studies of oxidized nickel aluminide (NiAl and Ni3Al) cross sections
AU Doychak, J.; Ruehle, M.
CS Inst. Werkstoffwiss., Max-Planck-Inst., Stuttgart, 7000/1, Fed. Rep. Ger.
SO Oxid. Met. (1989), 31(5-6), 431-52
CODEN: OXMEAF; ISSN: 0030-770X
DT Journal
LA English
AB Cross sections of oxide scale/Ni-Al intermetallic compd. were prepd. and studied by using TEM. The cross sections were prepd. by encasing an oxidized **metal** specimen sandwich in a low-melting-temp. Zn

alloy. Observations of oxidized Zr-doped .beta.-NiAl revealed crystallog. voids beneath an adherent Al2O3 scale. The oxide-**metal** interface was incoherent, but a high dislocation d. in the **metal** near the interface suggested that a high **tensile stress** was induced by the attached oxide scale. A duplex Al2O3-NiAl2O4 scale formed on Zr-doped and Zr/B-doped .gamma.'-Ni3Al alloys. Addnl. results are presented involving oxidn. mechanisms and oxide-**metal** interface structures.

L30 ANSWER 18 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1988:477936 HCAPLUS
DN 109:77936
TI Fatigue strength of welds of complexly alloyed aluminum bronzes
AU Belyaev, N. V.; Vainerman, A. E.; Potapov, V. V.; Salamashenko, A. G.
CS Leningrad, USSR
SO Avtom. Svarka (1988), (3), 15-18
CODEN: AVSVAU; ISSN: 0005-111X
DT Journal
LA Russian
AB The effects of welding conditions and subsequent annealing on the mech. properties of welds of Al-Ni bronze Br.A9Zh4N4 and Mn-Al bronze Br.A7Mts14Zh3NZ were studied. The low corrosion fatigue resistance of welds in seawater was due to high residual **tensile stresses** in the transition zone and nonequil. structure of the heat-affected zone. Annealing increased the fatigue strength of the weld almost to that of the parent **metal**.

L30 ANSWER 19 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1984:539101 HCAPLUS
DN 101:139101
TI Measurements of the true **tensile stress**-strain curves for reactor structural **metals**
AU Zhu, Xixiong; Feng, Decheng; Li, Jingsheng; Wang, Jingxian
CS Peop. Rep. China
SO Hedongli Gongcheng (1984), 5(1), 58-67, 57
CODEN: HDGOE6
DT Journal
LA Chinese
AB A tensiometer is described which can accurately det. the tensile elongation of the **metals**. The measuring technique is also described for the true stress-strain plots during the elastic-plastic deformation. The stress during the necking deformation was cor. to obtain the true stress of the uniaxial stress state. The true **tensile stress**-strain curves of some reactor structural **metals** were obtained which contain 3 structural steels, 2 stainless steels, and Zircaloy-2. The corresponding data of the tensile properties for these materials are given.

L30 ANSWER 20 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1982:550700 HCAPLUS
DN 97:150700
TI An evaluation of the four-point flexural test for **metal**-ceramic bond strength
AU DeHoff, P. H.; Anusavice, K. J.; Hathcock, P. W.
CS Eng. Sci. Mech. Mater. Dep., Univ. North Carolina, Charlotte, NC, 28223, USA
SO J. Dent. Res. (1982), 61(9), 1066-9
CODEN: JDREAF; ISSN: 0022-0345
DT Journal

LA English
AB An exptl. and anal. stress anal. of the four-point flexural test for **metal**-ceramic bond strength is presented. Specimen geometry dicates whether failure occurs at the porcelain surface or at the interface under a line of force magnification. Finite element stress anal. indicates that bond sepn., if it occurs, is probably due to normal **tensile stresses**.

L30 ANSWER 21 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1981:214545 HCAPLUS
DN 94:214545
TI Porcelain-**metal** thermal compatibility
AU Fairhurst, C. W.; Anusavice, K. J.; Ringle, R. D.; Twiggs, S. W.
CS Sch. Dent., Med. Coll. Georgia, Augusta, GA, 30912, USA
SO J. Dent. Res. (1981), 60(4), 815-19
CODEN: JDREAF; ISSN: 0022-0345
DT Journal
LA English
AB Detn. of the compatibility index, Ci, of an alloy-porcelain system is critically dependent on the glass transition temp. (Tg) of the porcelain. The Au-Pd, non-Ag alloy (O) demonstrated consistent neg. Ci values with opaque and body porcelains. Values of Ci for most opaque and body porcelain systems changed significantly between 1 and 5 firings. In some systems the Ci value change sign. Opaque-body porcelain systems exhibited Ci values of the same order of magnitude as alloy-opaque systems. Large pos. Ci values are indicative not only of tangential compressive stresses in porcelain, but also of radial **tensile stresses** which may contribute to system failure. It may be inferred from large Ci values for opaque-body systems that significant residual stress levels can develop between opaque and body porcelains. Such stresses must be considered in conjunction with the stress levels developed between alloy and opaque porcelains in evaluating alloy-porcelain compatibility.

L30 ANSWER 22 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1980:430554 HCAPLUS
DN 93:30554
TI Diffusion vacuum welding of Br.OTs10-2 bronze
AU Dzhevaga, I. I.
CS USSR
SO Tr. Nikolaev. Korablestroit. Inst. (1977), 121, 107-11
CODEN: TRNKBI; ISSN: 0372-1256
DT Journal
LA Russian
AB The optimal diffusion welding temp. of bronze BrOTs10-2 [**62476-64-6**] at 1 .times. 10-3-1 .times.10-4 torr was 850.degree., 5-8 min, and sp. pressure of 0.2 kg/mm2. Welds with strength equal to the base **metal** were obtained by diffusion welding. The differences in the 2 types of welding were due to the **tensile stresses** emerging during welding. During fusion welding the **tensile stresses** occurring were higher than the **metal** strength and plasticity at that temp. During solid-phase welding compressive pressures are applied to the welded articles and their values are controlled to prevent hot crack formation.

L30 ANSWER 23 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1975:551061 HCAPLUS
DN 83:151061
TI Sensitivity of **metals** to cycle asymmetry in a corrosive medium
AU Salamashenko, A. G.

CS Fiz.-Mekh. Inst., Lvov, USSR
SO Fiz.-Khim. Mekh. Mater. (1975), 11(2), 97-8
CODEN: FKMMAJ
DT Journal
LA Russian
AB Coeff. of **metal** sensitivity to the loading cycle asymmetry was calcd. for steel, Al bronze, and brass in sea water. Loading cycle amplitude decreased with increasing **tensile stress**. Alloys having higher strength were more sensitive to cycle asymmetry than those having lower strength.

L30 ANSWER 24 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1975:20773 HCAPLUS
DN 82:20773
TI Case studies on the failures of copper and copper alloys by stress corrosion cracking
AU Sato, Shiro; Nagata, Koji
CS Sumitomo Light Met. Ind., Nagoya, Japan
SO Sumitomo Keikinzoku Giho (1974), 15(3), 174-85
CODEN: SKEGA2
DT Journal
LA Japanese
AB Stress corrosion cracking of Cu is classified into environmental groups including ammoniacal conditions, polluted sea water, fresh water, steam, atm., underground, and molten **metal** conditions. Stress corrosion cracking is often accompanied by intergranular corrosion regardless of an applied **tensile stress**. It is important to clarify the elastic properties, plastic properties, and rupture sensitivity around the tips of intergranular corrosion under a **tensile stress**.

L30 ANSWER 25 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1974:123635 HCAPLUS
DN 80:123635
TI Intercrystalline attack of steel by molten **metals**
AU Raedeker, W.
CS Muelheim, Ger.
SO Werkst. Korros. (1973), 24(10), 851-9
CODEN: WSKRAT
DT Journal
LA German
AB The corrosion of soft Fe and steels optionally contg. Mo, Cu, and(or) Ni under **tensile stress** was tested in molten **metals**, e.g. pure Sn, Bi, Cd, Pb, Al, or Sn-Cu, Cd-Zn, Cd-Al, Cd-Ni, Pb-Bi, Pb-Zn, Pb-As, Pb-Sb, and Pb-Cu alloys. Among the pure **metals**, only Cd caused intercryst. corrosion with a redn. of rupture strength. Addns. of Zn, Cu, Sb, and Cd to the unreactive **metal** melts led to strong corrosion even at low concn., the attack being visible below the m. p. of the added element. Pb and Bi addns. with or without Mn, Al, As, or Ni had no effect.

L30 ANSWER 26 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1972:75576 HCAPLUS
DN 76:75576
TI Homogeneous lead for corrosion protection
AU Reinert, Max
CS Aug. Schnakenberg und Co., Wuppertal-Barmen, Ger.
SO Lead 68, Ed. Proc., Int. Conf., 3rd (1969), Meeting Date 1968, 373-86.
Editor(s): Dunlop, Robert H. Publisher: Pergamon, Oxford, Engl.

CODEN: 24KFAN
DT Conference
LA English
AB The behavior was studied of a homogeneous Pb coating, esp. under stringent practical conditions. A Pb-**Sn alloy** is generally used to facilitate the alloying process between Pb and the basis **metal**. Optimum results occur with 0.01-0.1% Sn when Pb is used in H2SO4 systems. The stress of the Pb coating is proportional to the temp. difference and to the difference in the thermal expansion coeffs. The shear stress in the diffusion zone of a steel sheet coated with homogeneous Pb increases as the Pb layer becomes thicker and the length of the sheet becomes smaller. The **tensile stress** in the diffusion zone of a pipe covered with homogeneous Pb similarly increases as the Pb layer increases and the radius becomes smaller. In the case of a homogeneous Pb coating with little or no Sn, it is unlikely that the Pb becomes detached from the steel surface even at temp. up to 300.degree.. Lifting of the Pb owing to H diffusion can be avoided only by checking of the heating or cooling space for traces of acid. Tests on homogeneous Pb coated specimens, which were heated to 150.degree. in 70% H2SO4 and then quenched in cold water, showed that the cracking is influenced by the grain size of the Pb, the difference in thermal expansion coeffs. between the basis **metal** and the Pb covering, the temp. difference, the thickness of the Pb layer, and the rate of heating. Even at elevated temp., Pb will not completely flow down a vertical wall.

L30 ANSWER 27 OF 27 HCAPLUS COPYRIGHT 2002 ACS
AN 1968:5786 HCAPLUS
DN 68:5786
TI Weldable titanium-base alloys containing aluminum, tin, zirconium, and molybdenum
IN Peebles, Roger E.
PA Titanium Metals Corp. of America
SO U.S., 4 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 3343951		19670926	US	19631017

AB .alpha.-Type strong ductile alloys no heavier than pure Ti contain Al 5.5-6.5, Sn 1.7-2.3, Zr 0.7-5, Mo 0.7-3, O .ltoreq.0.2, and the total of C, N, and O .ltoreq.0.25%. With reasonable production cost, 0.08% O is unavoidable, and for best high-temp. strength 0.12-0.16% O is desirable. The Al and Sn contents are adjusted to give .alpha.-phase ductility without embrittlement after long stressing at high temp. Zr and Mo provide solid soln. strengthening and are restricted to maintain light wt. and ductility after welding. Alloys contg. .apprx.2% Zr and 1% Mo had 0.162 lb./in.3 d., and rolled 1/2-in. plates had at room temp. 123,000 psi. 0.2% offset yield, 136,000 tensile strength, 19% elongation in 1 in., and 45% redn. of area; and at 800.degree.F. 71,000, 87,000, 17%, and 48%, resp. After 150 hrs. at 1000.degree.F. and 30,000 psi. stress, the strength and ductility were unchanged, and the creep was 0.25%. Many Charpy notch-bar impact resistances as rolled, as welded, and after various heat treatments involving air cooling from 1750 or 1900.degree.F. and tempering at 1000.degree.F. are reported, and were 20-36 ft.-lb. lengthwise and 14-24 transverse. Alloys contg. .apprx.4% Zr and 2% Mo had 0.166 lb./in.3 d., and the tensile properties 146,000, 154,000, 18%, and 45% at room temp., and at 800.degree.F. 98,000, 123,000, 20%, and 43%, resp. After 150 hrs.

at 1000.degree.F. and 30,000 psi. stress, the results were practically unchanged as above, except for 0.33% creep. Charpy impact results are not reported, but heat-treated notched specimens had over 230,000 psi. tensile strength and resisted failure at .ltoreq.210,000 psi. **tensile stress** for 5 hrs. The alloys were made conventionally by arc melting consumable electrodes in an inert atm. in ingot molds, the electrodes being composed of Ti sponge compacted with powd. other **metals**.

L33 ANSWER 1 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:651435 HCAPLUS
DN 133:304699
TI CoNi and FeCoNi fine particles prepared by the polyol process: physico-chemical characterization and dynamic magnetic properties
AU Toneguzzo, Ph.; Viau, G.; Acher, O.; Guillet, F.; Bruneton, E.; Fievet-Vincent, F.; Fievet, F.
CS CEA, Le Ripault, Monts, F-37260, Fr.
SO Journal of Materials Science (2000), 35(15), 3767-3784
CODEN: JMTSAS; ISSN: 0022-2461
PB Kluwer Academic Publishers
DT Journal
LA English
AB Spherical and monodisperse CoxNi100-x and Fez[CoxNi100-x]1-z particles are synthesized by the polyol process over a wide size range (lying from a few **micrometers** to a few tens of nm). The whole physicochem. characterizations, i.e. dark-field image by TEM, SAED, d., satn. magnetization and chem. anal., are consistent with a core-shell model. In the CoxNi100-x system, the particles are constituted by a ferromagnetic, almost pure and dense core surrounded by a thin **coating** composed of **metal** oxides and metallo-org. phases. On the contrary, in the Fe[CoxNi100-x]1-z system, the ferromagnetic core is polycryst., slightly porous and retains impurities in higher content, the superficial layer having almost the same compn. as in the Co-Ni system, but being twice more thick. The microwave permeability of the CoxNi100-x and Fez[CoxNi100-x]1-z particles, previously insulated by a superficial treatment and then mech. compacted, is studied in the 100 MHz-18 GHz frequency range. Whatever the compn., sub-**micrometer**-sized particles show several narrow resonance bands which are interpreted as non uniform exchange resonance modes. Iron-based particles have lower resonance frequencies than Fe-free powders; they also have higher permeability levels despite their lower crystallinity and their higher impurity content. A mild thermal treatment allows to increase this permeability by eliminating the metallo-org. impurities without modifying the morphol. of the particles.
RE.CNT 47 THERE ARE 47 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 1998:121486 HCAPLUS
DN 128:207565
TI Metal matrix composites fabricated by **metal coating**
AU Chang, Shou-Yi; Chung, Wen-Sheng; Lin, Jiunn-Horng; Lin, Su-Jien
CS Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan
SO THERMEC '97, International Conference on Thermomechanical Processing of Steels and Other Materials, 2nd, Wollongong, Australia, July 7-11, 1997 (1997), Volume 2, 1335-1341. Editor(s): Chandra, T.; Sakai, T. Publisher: Minerals, Metals & Materials Society, Warrendale, Pa.
CODEN: 65RAAQ
DT Conference
LA English
AB Metal matrix composites can be fabricated via **metal coating** techniques to overcome the problem of the non-wetting or clustering of the reinforcement. An electroless Ni-P plating on SiC particles increases the wettability between SiC particles and Al alloy melt. Hence, a SiC particle/Al-5.9Si-0.23% Mg composite can be completely infiltrated by a vacuum infiltration of Ni-P coated particles at

700.degree.. An electroless Ag plating was used to coat SiC whiskers with Ag. A composite with 20 vol.% SiC whisker/Ag composite was fabricated by hot pressing of Ag-coated SiC whiskers at 600.degree. and 30 MPa for 15 min in air. The distribution of SiC whiskers is uniform, and the strengthening effect is high. Similar results were obtained for fabricating **micrometer** Al2O3 particle reinforced Ag composites. Controlling the thickness of Ag films, composites with various vol. fractions of Al2O3 particles were obtained. Then 150 .mu.m stainless steel filaments were wound and coated with an electrodeposited Ni film. These fibers were alternatively stacked with 100 .mu.m thick Al foil and diffusion bonded at 500.degree., 100 MPa for 10 min in vacuum. A Ni/stainless steel fiber/Al composite precursor was obtained. Lower-temp. reactive hot pressing of the precursor at 700.degree. allowed a reaction between Ni and Al and formed a stainless steel fiber reinforced NiAl composite.

L33 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:497604 HCAPLUS
DN 127:209060
TI Depth profiling of thick layers of graded **metal**-zirconia ceramic **coatings** using laser ablation inductively coupled plasma atomic emission spectrometry
AU Kanicky, Viktor; Novotny, Ivan; Musil, Jan; Mermet, Jean-Michael
CS Dep. anal. Chem., Fac. Sci., Masaryk Univ., Bmo, CZ-61137, Czech Rep.
SO Applied Spectroscopy (1997), 51(7), 1042-1046
CODEN: APSPA4; ISSN: 0003-7028
PB Society for Applied Spectroscopy
DT Journal
LA English
AB The feasibility of depth profiling of thick layers (>100 .mu.m) consisting of partially stabilized zirconia **coating** and graded **metal**-ceramic **coating** on Inconel steel (ZrO2-Y2O3/NiCrAlY/steel and ZrO2-CeO2/NiCrAlY/steel) was studied on the basis of the use of laser ablation inductively coupled plasma at. emission spectrometry (LA-ICP-AES). An ICP spectrometer equipped with a multichannel detection was used for the simultaneous measurements of the line intensities. The ablation was performed with a Nd:YAG laser operated in a Q-switched mode at 266 nm. To study the erosion rate, we used either a static or a translation mode for the ablation, and the corresponding temporal behavior of the signals was studied. A higher erosion rate was found for the translation mode when depths higher than several hundred **micrometers** were probed.

L33 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:519159 HCAPLUS
DN 125:259504
TI A novel plating process for microencapsulating metal hydrides
AU Law, H. H.; Vyas, B.; Zahurak, S. M.; Kammlott, G. W.
CS AT&T Bell Laboratories, Murray Hill, NJ, 07974, USA
SO J. Electrochem. Soc. (1996), 143(8), 2596-2601
CODEN: JESOAN; ISSN: 0013-4651
DT Journal
LA English
AB On approach to increasing the lifetime of the metal hydride electrode was the use of conventional electroless plating to produce a coating of copper or nickel on the surface of the metal hydride powders. A novel method for microencapsulating the active electrode powders is presented. This new plating technique takes advantage of the reducing powder of hydrogen already stored inside the metal hydride to plate a variety of metals into

metal hydride materials. This method greatly simplifies electroless plating for these powders, eliminating the need for stabilizers and additives typically required for conventional electroless plating solns. Metals that can be electrolessly plated with stored hydrogen were identified based on thermodn. considerations. Exptl., **micrometer** thick coatings of copper, silver, and nickel were plated on several metal hydrides.

L33 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:242951 HCAPLUS
DN 124:295850
TI The preparation, properties and applications of some glass-**coated metal** filaments prepared by the Taylor-wire process
AU Donald, I. W.; Metcalfe, B. L.
CS Atomic Weapons Establishment, Aldermaston, Berkshire, UK
SO J. Mater. Sci. (1996), 31(5), 1139-49
CODEN: JMTSAS; ISSN: 0022-2461
DT Journal
LA English
AB The Tylor-wire method offers a versatile and intrinsically inexpensive route for the manuf. of glass-**coated metal** filaments a few **micrometers** in diam. in a single operation directly from the melt. The prepn. by this process of a no. of microcryst. and amorphous microwires is reported. Materials investigated have included copper, four different Ni-Si-B alloys and a C o-Mo alloy. The resultant properties of the microwire products prepd. from these materials are summarized. One potential application for microwire is in the area of composite materials and data are presented outlining the prepn. directly from microwire of metal filament-reinforced glass-matrix composites. In conclusion, a no. of alternative potential applications for microwire are briefly discussed.

L33 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 1995:421822 HCAPLUS
DN 122:170111
TI Comparison of bone-implant interface shear strength of hydroxyapatite-coated and alumina-**coated metal** implants
AU Inadome, T.; Hayashi, K.; Nakashima, Y.; Tsumura, H.; Sugioka, Y.
CS Dept. Orthopaedic Surgery, Kyushu Univ., Fukuoka, Japan
SO J. Biomed. Mater. Res. (1995), 29(1), 19-24
CODEN: JBMRBG; ISSN: 0021-9304
DT Journal
LA English
AB The authors performed a trans-cortical push-out test to det. the effect of surface roughness of hydroxyapatite (HA)-coated implants on bone-implant shear strength in a canine model. Hydroxyapatite- and alumina-coated SUS316L with the same surface roughness (roughness av.: Ra = 5 .mu.m) and HA-coated Ti-6Al-4V (Ra = 8.4 .mu.m), sintered HA (Ra = 0.9 .mu.m), and dense alumina (Ra = 1.3 .mu.m) were inserted into the dog's femur. The interface shear strength of the dense alumina was significantly lower than that of other implants at both 4 and 12 wk after implantation. At 4 wk after implantation, the interface shear strength of the alumina-coated SUS316L was lower than that of other implants except the dense alumina, but at 12 wk, there was no significant difference between the implant types except the dense alumina. The surface roughness of the HA coating affects the enhancement of the bone-implant interface shear strength at the early period after implantation, and a surface roughness of several **micrometers** does not influence the bond strength between bone and HA. A scanning microscopic study indicated that in almost all cases at 12

wk, the failure site after push-out testing was the coating-substrate interface, not the coating-bone interface. Therefore, protection of the coating-substrate interface from direct shear loading is needed.

L33 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2002 ACS
AN 1992:596311 HCAPLUS
DN 117:196311
TI Conical surface textures formed by ion bombarding 2% beryllium-copper alloy
AU Panitz, Janda K. G.
CS Sandia Natl. Lab., Albuquerque, NM, 87185, USA
SO J. Micromech. Microeng. (1991), 1(1), 52-9
CODEN: JMMIEZ; ISSN: 0960-1317
DT Journal
LA English
AB A homogeneous **micrometer**-sized conical surface texture formed on a Cu-2% Be alloy bombarded by an Ar beam produced by a Kaufman ion source. Dimensions of the features that form depend strongly on Ar ion energy 250-1500 eV, fluence 1019-1020 ions/cm2, and flux 0.1-1 mA/cm2. The texture morphol. depends less strongly on the background ambient (Mo vs. graphite), prior heat treatment, and bombardment temp. 100-450.degree.. As the texture matures with increasing fluence, the no. of large features increases at the expense of the no. of small features. The obsd. relation between texture formation and ion flux suggests that evolution of these features is not adequately described by theories predicting that the mature conical side-wall angle is related to the angle of the max. sputtering yield. These textured surfaces can be **coated** with other **metals** for a variety of possible applications including pulsed power Li beam anodes, cold cathode field emission devices, optical absorbers, and catalyst supports.

L36 ANSWER 1 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:10228 HCAPLUS
DN 134:150946
TI Removing of surface oxide film of SUS316 and improvement of diffusion-bondability of A6061 aluminum alloy to SUS316 stainless steel using surface-activated pre-coating technique -study on diffusion bonding of aluminum alloy to stainless steel (report 3)-
AU Nishimoto, Kazutoshi; Saida, Kazuyoshi; Kuroda, Shinichi
CS Osaka University, Japan
SO Yosetsu Gakkai Ronbunshu (2000), 18(4), 563-571
CODEN: YGRODU; ISSN: 0288-4771
PB Yosetsu Gakkai
DT Journal
LA Japanese
AB The diffusion-bondability of A6061 aluminum alloy to SUS316 stainless steel has been improved by using surface-activated pre-coating technique for SUS316 stainless steel. The surface-activated treatment for SUS316 was carried out by series of steps as alk. cleaning .fwdarw. electrolytic cleaning .fwdarw. HCl activating .fwdarw. **metal**-strike **coating** prior to diffusion bonding. Diffusion bonding of A6061/SUS316 was conducted at 758 K-823 K for 0.6 ks-7.2 ks applying 9.8 **MPa** in vacuum. ESCA analyses revealed that the surface oxide film could be removed by surface-activated pre-coating treatment and that strike **coating** insert **metals** would act as a barrier to reoxidn. of SUS316. The tensile strength of A6061/SUS316 joints using Ag, Cu, and **Ni** strike **coating** insert **metals** was increased to about 100 **MPa** bonded at 758 K for 0.6 ks indicating nil joint strength in direct-bonding situation. The reaction layer growth in A6061/Ag striking/SUS316 joint was followed by the parabolic growth law, and the incubation time for reaction layer growth using Ag striking insert metal was shortened compared with direct-bonding situation.

L36 ANSWER 2 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:400127 HCAPLUS
DN 133:77516
TI Internal stress and adhesion of amorphous Ni-Cu-P alloy on aluminum
AU Chen, C.-J.; Lin, K.-L.
CS Department of Materials Science and Engineering, National Cheng Kung University, Tainan, 701, Taiwan
SO Thin Solid Films (2000), 370(1,2), 106-113
CODEN: THSFAP; ISSN: 0040-6090
PB Elsevier Science S.A.
DT Journal
LA English
AB This study investigated the effect of saccharin on the internal stress and the adhesion of amorphous Ni-Cu-P deposited on aluminum. An amorphous Ni-Cu-P deposit with slight compressive stress can be produced when one adds 8-10 g/l saccharin into the Ni-Cu-P deposition soln. The stress relief mechanism was investigated. The addn. of saccharin restrains the coalescence of the islands within Ni-Cu-P nodules and reverses the internal stress of the electroless Ni-Cu-P deposit from tensile to compressive. The adhesion strength of the Si/Ti/Al/**Ni**-Cu-P **multilayer** specimen obtained with 10 g/l saccharin is around 35 to 45 **MPa**, and the fracture occurs at the silicon substrate after the pull test. The shear strength of the Ti/Al/Ni-Cu-P bump (100.times.100 .mu.m) on Si is 132.9.+-.12.7 g, and the fracture occurs at the Ni-Cu-P deposit after the shear test. Moreover, the inhibition of coalescence of the fine islands within Ni-Cu-P nodules increases the

brightness and the hardness of the deposit.
RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L36 ANSWER 3 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:139540 HCAPLUS
DN 132:183749
TI High-strength superfine steel wire with good corrosion fatigue characteristic
IN Sasaki, Masashi; Tashiro, Hitoshi
PA Nippon Steel Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2000063990	A2	20000229	JP 1998-232792	19980819

AB The wire is from steel contg. C 0.6-1.5, Si 0.1-1.0, Mn 0.1-1.0, and Al .ltoreq.0.005%. The wire has a diam. .ltoreq.0.40 mm and is **coated** with a **metal** or org. film (0.01-0.5 .mu.m). The wire has a tensile strength of .gtoreq.3600 **MPa** and a contact angle of .gtoreq.30.degree. with an aq. soln. contg. Cl-, NO3-, SO42-, and/or PO43-. The wire is suitable for reinforcement of rubber products.

L36 ANSWER 4 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:528835 HCAPLUS
DN 131:275036
TI Microstructure and properties of WC-**Co**/NiCrBSi brazing **coating**
AU Lu, Shanping; Guo, Yi; Chen, Liangshan
CS Institute of Metal Research, Chinese Academy of Sciences, Shenyang, 110015, Peop. Rep. China
SO Journal of Materials Science & Technology (Shenyang, People's Republic of China) (1999), 15(3), 283-285
CODEN: JSCTEQ; ISSN: 1005-0302
PB Journal of Materials Science & Technology
DT Journal
LA English
AB Through rolling technol., a flexible metal cloth consisting of metal powder (NiCrBSi powder or WC-Co powder) in a certain ratio were made, which could be used as brazing coating raw materials. WC-**Co** /NiCrBSi wear **coating** was fabricated through high temp. vacuum brazing after the flexible metal clothes were assembled on 42CrMo steel surface. The tensile strengths of coating self and coating/matrix approached to 100.apprx.140 **MPa** and 300-360 **MPa**, resp., at different brazing parameters. Effect of Co on the wear property of the coating was analyzed. The abrasive wear property of WC-**Co** /NiCrBSi brazing **coating** is better than WC-17Co/NiCrBSi flame overlaying and CoCrW overlaying.
RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L36 ANSWER 5 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1998:585909 HCAPLUS
DN 129:178711
TI **Metal coating** by powder spray on the substrates with a masking pattern

IN Miyasaka, Yoshio
PA Fuji Kihan Co., Ltd., Japan
SO Eur. Pat. Appl., 18 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 860516	A2	19980826	EP 1998-101837	19980203
EP 860516	A3	19990519		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 10280165	A2	19981020	JP 1997-89262	19970408
PRAI JP 1997-21581		19970204		

AB The metal, ceramic, or polymer surface with a masking pattern layer is **coated** by **metal** powder spray ejected at .gtoreq.80 m/s (or at the ejection pressure .gtoreq.0.3 **MPa**) to deposit adherent coating by a low-temp. process. The metal powder preferably has the av. particle size of 20-300 .mu.m (esp. 30-60 .mu.m), as well as the m.p. and hardness lower than that of a metal substrate. The typical metal powders are Al or Sn. The pattern on a masking layer can be cut by sand blasting, followed by the powder-spray coating. The process is suitable for applying decorative Au-powder layer on porcelain articles. The **Sn coating** 5 .mu.m thick on stainless steel surface was effective as a masking layer in preventing local nitridation from gas phase.

L36 ANSWER 6 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1998:405462 HCAPLUS
DN 129:57408
TI Copper mold for casting of zinc-containing alloys
IN Yuse, Fumio; Yamamoto, Kenji; Nakayama, Takenori; Kato, Atsushi; Urushibara, Wataru
PA Kobe Steel, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10156490	A2	19980616	JP 1997-35259	19970219
PRAI JP 1996-64787		19960321		
JP 1996-64788		19960321		
JP 1996-261050		19961001		

AB A mold for casting Zn-contg. alloys consists of a Cu or Cu alloy mold coated on the inside with a Cr protective layer having a residual compressive stress of .gtoreq.350 **MPa** at least in the meniscus area. A Ni and/or Fe alloy layer (on the mold side) and an Fe and/or **Co** alloy **layer** (on the coating side) can be provided between the mold and the coating.

L36 ANSWER 7 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1998:97610 HCAPLUS
DN 128:183271
TI Influence of CaSi2 and Si additions on properties of coatings produced by plasma spraying of composite powders
AU Borisov, Yu.; Borisova, A.; Tunik, A.; Knyaz, M.; Bobrik, V.

CS Paton Welding Institute, Kyiv, Ukraine
SO Thermal Spray: A United Forum for Scientific and Technological Advances, Proceedings of the United Thermal Spray Conference, 1st, Indianapolis, Sept. 15-18, 1997 (1998), Meeting Date 1997, 707-712. Editor(s): Berndt, Christopher C. Publisher: ASM International, Materials Park, Ohio. CODEN: 65QNAQ
DT Conference
LA English
AB The effect of 3-12 wt.% CaSi2 and Si addns. on the thermal spraying of metal powders was investigated. The base metal of the powders was Ni, Ni-Cr and Fe. Plasma coatings produced by using these powders had a high d. and adhesion. The coating microstructure has a high grade of microcrystallinity. The oxide content in the coatings decreases with increasing of CaSi2 and Si content in the powders. The addn. of CaSi2 and Si to **Ni coatings** increases a microhardness from 1900-2000 to 2200-2850 **MPa**. In case of **Ni**-Cr **coatings**, this increase was from 1800-2100 to 2400-3500 **MPa**.

L36 ANSWER 8 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:612605 HCAPLUS
DN 127:281692
TI Composite Ni-Al wires for arc spraying
AU Szulc, Tomasz
CS Zakladzie Spawalnictwa, Automatyzacji Politechniki Wroclawskiej, Instytutu Technologii Maszyn, Pol.
SO Przeglad Spawalnictwa (1997), 49(7), 5-9, 12-14
CODEN: PRZAA3; ISSN: 0033-2364
PB Agenda Wydawnicza SIMP
DT Journal
LA Polish
AB Best adhesive strength (.apprx.60 **MPa**) was obtained for Ni-15%Al alloy wires. Adhesion is decreased by excessive oxidn. (e.g., with Ni-30%Al alloy) or particle deformation (e.g., in spraying at <150 mm distance from the substrate). Adhesion is increased by increasing wire diam. (to 2 mm), feed rate, air pressure (to 0.55 **MPa**), and spraying distance. The surface roughness, porosity, hardness, and nonuniformity are smaller for Ni-15%Al than for Ni-30%Al. The substrate temp. is <150.degree..

L36 ANSWER 9 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:48916 HCAPLUS
DN 126:107175
TI Wear-resistant and abrasive diamond-containing coatings
AU Tsisar, I. A.; Znamenskii, G. N.; Yushchenko, T. I.; Paches, L. V.
CS Vinnits. Gos. Tekh. Univ., Vinnitsa, Ukraine
SO Gal'vanotekhnika i Obrabotka Poverkhnosti (1996), 4(1), 21-28
CODEN: GOPOEF; ISSN: 0869-5326
PB Moskovskii Khimiko-Tekhnologicheskii Institut im. D. I. Mendeleeva
DT Journal
LA Russian
AB Dependence of quantity of synthetic diamond powder in composite coatings on properties of electroplated matrixes of Ni, Fe, Co, Cu, Cd, Zn, Zn-Ni, Zn-Fe, Zn-Co and of electroless plated matrixes of Cu, Cu-Ni, Ni-P-Cu has been studied. It has been shown that the higher the coating microhardness (HV) and the less the min. crit. plating c.d. (icr.min.) and the less the grain size of metal dmet) the greater is the surface concn. of diamond powder in the coating (Cp). When (NH2)2CS is added to the copper plating bath the HV and icr.min rise and Cp increases from 0 to 30%. With

increase in hardness and decrease in dMe of electroless plated Cu and Ni-P-Cu alloy Cp is increased 10-60%. Hardness and Cp in Fe coatings are increased after addn. to Fe plating bath of activating additives V, Mo, Ta, Zr. Zn-Ni, Zn-Co, Zn-Fe alloys have dMe 5-10 times less, hardness and icr.min higher, Cp is by 40-50% higher than Zn coating. Cp is low at low pH because of high hydrogen C.E., high hydrogen bubbles evolution, which peels off diamond particles from cathode surface. It has been found that to obtain high diamond powder concn. in the coating the grain size of coating must be 5-10 times less than the size of diamond particles and the microhardness of the matrix should not be less than 1200-1500 **MPa** . Industrial and lab. tests of synthetic corundum treatment by diamond-contg. tools have shown that the type of powder affects the intensity of burnishing and practically has no influence on disk resistance,. Electroplated disks (ED) showed good results (as compared with serial disks) during the treatment of semi-oval stones. About 200-400 stones were treated by electroplated disks with diamond-contg. coating for a period of 9-13 shifts. ED showed high effectiveness when sawed out on heart-shaped stones, here capacity as evaluated for 1 stone increased 28 times, while the quantity of treated stones on one disk reached 480. Technol. has been developed for the prodn. of complex-shaped disks with electroplated coating with AC 15 powder (grain size ra=200-160 .mu.m). The disks have been used during natural stones treatment for obtaining workpieces of ellipsoidal form with axes 60 and 45 mm ("egg"). When natural diamonds are sawed with electroplated disks, sawing intensity and disk resistance are higher, while losses of expensive feed materials are lower than at sawing by serial disks. The developed technique has been implemented at several plants for natural diamond, synthetic corundum, natural and man-made stones and hard alloys treatment.

L36 ANSWER 10 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:78557 HCAPLUS
DN 124:152530
TI The activated brazing bonding between alumina and Inconel 600 using Ag-Cu filler metal after Ti and Zr coatings
AU Cho, Sun-Wook; Lee, Rhim-Youl
CS Dep. Mater. Sci. Eng., Dankook Univ., Cheonan, 330-714, S. Korea
SO Taehan Kumsok Hakhoechi (1995), 33(10), 1315-22
CODEN: TKHCDJ; ISSN: 0253-3847
DT Journal
LA Korean
AB Alumina ceramics and Inconel 600 alloy were bonded using conventional brazing filler metal of Ag-Cu alloy after Ti and Zr coatings onto alumina surface. Then the effect of **metal coatings** on the interfacial structure and metallurgical behavior at interface between the filler metal and Inconel 600 were investigated. It was found that a prior sputter coating of Ti or Zr was effective in wetting even to the alumina surface of difficult-to-wet with Ag-Cu brazing alloy. The bonding shear strength employing Ag-Cu brazing alloy was increased from zero to 12 **MPa** with 3 .mu.m Ti coating. Although this bonding strength was lower than that of 25 **MPa** for using active brazing metal of Ag-Cu-Ti, the active **metal coating** method prior to brazing with Ag-Cu alloy might give a beneficial effect assocd. with a lower melting temp. of eutectic Ag-Cu alloy compared to Ag-Cu-Ti. And also it was found that the Ti coating and/or Ti segregation during brazing enhanced the sepn. of silver- and copper-rich liq. phases in molten filler metal causing a coarse microstructure.

L36 ANSWER 11 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1992:239336 HCAPLUS

DN 116:239336
TI **Metal coatings** by brush plating
AU Grzes, Jaroslaw
CS Zak. Spawal., Politech. Warszawska, Warsaw, Pol.
SO Przegl. Spawal. (1991), 43(7-9), 27-9
CODEN: PRZAA3; ISSN: 0033-2364
DT Journal
LA Polish
AB Steel 45 was brush plated in Nickel Compact High Speed electrolyte at 8-16 V; underlayers were deposited from Nickel Special and Copper Alk. 1 electrolytes. The highest microhardness (6090 **MPa**) and wear resistance are obsd. for plating at 12 V. The **coating** contains **Ni** 88.75, W 10.633, and Fe 0.599%.

L36 ANSWER 12 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1991:28126 HCAPLUS
DN 114:28126
TI Generation mechanisms of residual stresses in plasma-sprayed coatings
AU Kuroda, S.; Fukushima, T.; Kitahara, S.
CS Div. Adv. Mater. Process., Natl. Res. Inst. Met., Tokyo, 153, Japan
SO Vacuum (1990), 41(4-6), 1297-9
CODEN: VACUAV; ISSN: 0042-207X
DT Journal
LA English
AB Stresses generated in plasma-sprayed coatings were evaluated dynamically by measuring the curvature of a strip-shaped substrate throughout the process of deposition. Four kinds of powder, Mo, Ni, Al, and Ni-20%Cr alloy, were plasma sprayed in air on Mo, Ni, Al, Ni-20%Cr alloy, and mild steel substrates. The stress due to deposit build-up is always tensile, whose magnitude mainly depends on powder and not the substrate. Stresses of 10-100 **MPa** occurred in the order Al .apprx. Mo < Ni < Ni-20%Cr alloy. From the curvature change at the onset of spraying, on which surface treatment of substrate had a significant influence, a higher tensile stress within a boundary layer between the coating and underlying substrate was suggested.

L36 ANSWER 13 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1990:483405 HCAPLUS
DN 113:83405
TI Nitriding of complex machinery and equipment parts
IN Has, Zdzislaw; Gramsz, Jerzy; Kula, Piotr; Rzepkowski, Antoni
PA Politechnika Lodzka, Pol.
SO Pol., 2 pp.
CODEN: POXXA7
DT Patent
LA Polish
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PL 136552	B2	19860228	PL 1983-245365	19831227

AB Machinery parts are **coated** with a **metal** and then nitrided for wear resistance. Thus, a timing chain for an internal-combustion engine was dipped 3.5 h in a bath contg. NiCl2.6H2O 20, NaH2PO4.H2O 24, and AcONa 10 g/L at 353 K to give a **Ni coating**, rinsed, and then sulfonitrided 7.5 h in a gas atm. contg. NH3 and S at 0.1 **MPa** and 793 K for wear resistance.

L36 ANSWER 14 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1990:122805 HCAPLUS

DN 112:122805
TI Structure and properties of detonation coatings from eutectic compositions based on iron and nickel
AU Loskutov, V. F.; Kunitskii, Yu. A.; Korzhik, V. N.
CS USSR
SO Tekhnol. Organ. Proizvod. (1989), (4), 50-1
CODEN: TEOPAE; ISSN: 0131-7202
DT Journal
LA Russian
AB Alloys of eutectic compns. based on Fe and Ni alloyed with Ti, Mo, Cr, B, C, Si, and P were used for detonation **coatings** of **metals** and alloys using an O-gas mixt. Due to high cooling rates during detonation coating (106-108 K/s), the metastable amorphous and microcryst. phases are formed which ensure high wear and corrosion resistance. The optimal ratio of O2/C2H2=1:1 gives the highest level of amorphization. The enrichment of the gas mixt. for detonation coating with O increases the content of cryst. inclusions in the coating. The use of addnl. electromagnetic energy during detonation coating facilitates fusion of the powder with particle size .ltoreq.120 .mu.m. The adhesion strength of the coating is 60-120 **MPa**, depending on the compn. of the powder for detonation coating, powder size, and compn. of detonating gas mixt. The acid corrosion resistance of amorphous coatings made by detonation of eutectic powder Fe-Cr-P-C was by 2 orders of magnitude higher than that of cast alloys of similar compn. The stability of the amorphous structure in coatings of Ni60Nb40 and Fe40Ni40B20 alloys, obtained by plasma and by detonation, is discussed.

L36 ANSWER 15 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1989:426665 HCAPLUS
DN 111:26665
TI Formation of a **multilayer nickel**-boron-chromium **coating**
AU Dalisov, V. B.; Mardarevich, R. S.; Brodyak, Ya. P.
CS L'vov. Fiz. Inst., Lvov, USSR
SO Zashch. Pokrytiya Met. (1988), 22, 58-61
CODEN: ZPMEAC
DT Journal
LA Russian
AB The wear resistance of steel 40KhN with a 2-**layer Ni**-B-Cr **coating** (i.e., **Ni**-B and Cr electroplates) in dry friction conditions at sp. load 1 **MPa** and sliding velocity 0.67 m/s was much higher than that of uncoated 40KhN and Cr-electroplated samples. The best results were obsd. after heat treatment at 900 and 1000.degree. for 4 and 2 h, resp., which ensured an increase in the size and quantity of borides. The heat and high-temp. oxidn. resistances of the **Ni**-B-Cr-**coated** steel were higher than those of stainless steel 12Kh18N10T. The **metal-coating** bonding strength tested in rotational bending was excellent.

L36 ANSWER 16 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1988:635265 HCAPLUS
DN 109:235265
TI Durability of a high-temperature solid lubricant coating as a function of chemical-thermal methods for modification of metal surfaces
AU Rubtsova, Z. S.; Sentyurikhina, L. N.; Nikonorov, E. M.; Makotrenko, N. A.
CS USSR
SO Vestn. Mashinostr. (1988), (6), 61-3
CODEN: VMASAV; ISSN: 0042-4633
DT Journal

LA Russian
AB The effect of thermochem. modification of a metal surface (stainless steel 12Kh18N10T or Ti alloy VT14, VT1, or VT9) on the service life of a solid lubricant coating was studied during friction at 1577 **MPa** and sliding rate 0.87 m/s. Preliminary oxidn., boronizing, electroless **Ni coating**, or nitridation of the Ti alloys did not give any advantages over the conventional sand blasting in testing of the STS-23 coating (based on alk. metal fluorides and inorg. binder) at 500.degree.. At 150.degree., nitridation was effective, giving a 3-times increase in the service life of the NP-212 coating. Boronizing of the stainless steel made it possible not only to increase the lubricant coating life (at 600.degree.), but also to retain high servicability in cyclic effects of extremely low (-186.degree.) and high (600.degree.) temps.

L36 ANSWER 17 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1988:635075 HCAPLUS
DN 109:235075
TI Deposition of diamond-containing coatings
IN Dorozhkin, N. N.; Yarkovich, A. M.; Belotserkovskii, M. A.; Bocharov, A. M.; Vereshchagin, V. A.; Zhornik, V. I.; Razumovskii, A. G.; Savchenkov, N. A.
PA Institute of Problems of Machine Reliability and Durability, Academy of Sciences, Belorussian S.S.R., USSR
SO Ger., 5 pp.
CODEN: GWXXAW
DT Patent
LA German
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 3706496	C1	19880317	DE 1987-3706496	19870227
	CH 672320	A	19891115	CH 1987-591	19870218
	JP 63210203	A2	19880831	JP 1987-40526	19870225
	HU 46375	A2	19881028	HU 1987-724	19870225
	HU 198414	B	19891030		
PRAI	DE 1987-3706496		19870227		

AB A diamond-contg. powder mixt. is deposited on a metal surface, and sintered at 10-50 **MPa** and elec. impulse c.d. of 0.3-1.5 kA/mm2. The mixt. contg. 24-60 vol% diamond powder and balance metal has an elec. resistivity of 0.05 .times. 10-6 to 0.3 .times. 10-3 .OMEGA.-m. The diamond coating is suitable for tools. Thus, a diamond powder 40-50-.mu.m diam. coated with 24 vol.% Ni having an elec. resistivity of 2.0 .times. 10-5 .OMEGA.-m was gas-flame deposited on a steel substrate to form a 0.1-mm-thick layer at 26 **MPa** between 2 electrodes supplied elec. impulse c.d. of 1.08 kA/mm2. After sintering, the diamond-contg. coating had an adherence of 75 **MPa** and porosity 2%.

L36 ANSWER 18 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1988:554569 HCAPLUS
DN 109:154569
TI Cermets for use as cutting tools, and process for their manufacture
IN Kramer, Bruce M.; Dombrowski, David M.; Gonseth, Denis; Yang, Minyang; Kohler, Stephen P.
PA Stellram S. A., Switz.
SO Eur. Pat. Appl., 7 pp.
CODEN: EPXXDW
DT Patent
LA French

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 263427	A2	19880413	EP 1987-114248	19870930
	EP 263427	A3	19890927		
	EP 263427	B1	19930811		
	R: AT, BE, CH, DE, ES, FR, GB, IT, LI, LU, NL, SE				
	US 4792353	A	19881220	US 1986-917577	19861010
	AT 92971	E	19930815	AT 1987-114248	19870930
	JP 63134644	A2	19880607	JP 1987-253943	19871009
PRAI	US 1986-917577		19861010		
	EP 1987-114248		19870930		

AB The cermets comprise a 1st phase, consisting entirely of Al2O3 particles or of an Al2O3-based solid soln., uniformly distributed over a 2nd matrix, phase that is not reactive with Al2O3, and consists essentially of a 1st metal and TiC. The amt. of TiC present between the 1st and 2nd phase is such that it inhibits chem. reaction between the phases at sintering temp. The cermets have oxide phase-free interphases; they are resistant to cracking and abrasion, and are useful as cutting tools. Fine Al2O3 powder is entrained by Ar into a plasma reaction chamber fed with TiCl4, CH4, and H. The resulting powder was milled for 24 h, uniaxially compressed at 700 **MPa** to obtain preforms that were sintered in vacuum at 1370.degree.. Encapsulation with metal was carried out by isostatic compression at 370 **MPa** and 1370.degree., and at 242 **MPa** at 1375.degree.. A specimen consisting of Al2O3 65.8, Ni 29.0, and TiC 5.2 vol.% had Vickers hardness 1497 kg/mm2, cracking resistance 0.79 MJ/m2, elastic modulus 339 GN/m2, fracture toughness 9.0 MN/m1.5, and crack propagation energy 239 J/m2, vs. 1724 kg/mm2, 0.36 MJ/m2, 390 GN/m2, 4.2 MN/m1.5, and 45 J/m2, resp. for sintered 99.9% pure Al2O3.

L36 ANSWER 19 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1987:559487 HCAPLUS
DN 107:159487
TI Internal stress measurements of electroless **nickel** **coatings** by the rigid strip method
AU Parker, Konrad
CS Park Ridge, IL, 60068, USA
SO ASTM Spec. Tech. Publ. (1987), Volume Date 1986, 947(Test. Met. Inorg. Coat.), 111-22
CODEN: ASTTA8; ISSN: 0066-0558
DT Journal
LA English
AB Residual macrostresses in electroless **Ni** (EN) **coatings** affected crit. deposit properties such as hardness and adhesion. Straight thin Al, Be, and steel strips were plated in hot Ni hypophosphite baths varying in chem., pH, and usage. When the **Ni**-P **coating** was stripped from 1 side the metal strip assumed a concave (tensile) or a convex (compressive) arch because of internal stress in the EN coating. The degree of curvature was measured and the residual stress calcd. The total stress consisted of an intrinsic component resulting from plating bath chem. and usage and a thermal stress produced by the difference in thermal expansion coeffs. between the EN coating and the substrate. On Al strong compressive stresses were induced by its larger shrinkage, which occurred during cooling from bath (90.degree.) to room temp. Annealing decreased the compressive stress. With usage of the EN bath the coatings decreased in compressive stress and after 3-5 turnovers were tensile stressed and blistered because of adhesive failure. On Be compressive stress occurred if the EN coating contained >11% P. Annealing changed the stress to tensile. On steel the initial low tensile stress increased

linearly with bath usage and reached 180 **MPa** after 6 turnovers, which was moderated by annealing at 200.degree.. The internal stress of EN coatings depended on the chem. and usage of the bath, the substrate, and the P content of the deposit.

L36 ANSWER 20 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1986:577106 HCAPLUS
DN 105:177106
TI Rare earth metal-transition metal alloys for magnets
IN Yamagishi, Wataru; Hashimoto, Kaoru
PA Fujitsu Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 3 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 61130436	A2	19860618	JP 1984-251941	19841130

AB To have high strength, powd. rare earth metal-transition **metal** alloy is **coated** with electroless **Ni** or **Ni alloy** and sintered. Thus, Sm2(Co,Fe,Cu)17 powder av. 3-5.mu. diam. was **coated** with **Ni** .apprx.1.mu. thick in a bath contg. NiCl2, Na glycolate, and NaH2PO2 at pH 4-6 and 90.degree.. The coated powder was compacted at 1-4 ton/cm2 in 10-15 kOe magnetic field, hot-pressed at 1100.degree. and 1 ton/cm2 for 0.5 h in Ar, sintered at 1200.degree. for 1 h in H2, soln.-treated at 1160.degree. for 1 h in Ar, and aged at 800.degree. for 5 h. The bend strength was 160-200 **MPa**, compared to 100-120 for alloy sintered from uncoated powder.

L36 ANSWER 21 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1986:93013 HCAPLUS
DN 104:93013
TI Plasma sprayed wear-resistant coatings. Results and recommended applications
AU Fehrmann, Hans Joachim; Mittler, Klaus; Oswald, Agnes
CS VEB Komb. Umformtech. "Herbert Warnke", Erfurt, Ger. Dem. Rep.
SO Schweisstechnik (Berlin) (1985), 35(11), 485-8
CODEN: SCTCA9; ISSN: 0036-7192
DT Journal
LA German
AB The hardness, structure, and uses of plasma-sprayed coatings of various substrates, such as metals, ceramics and plastics are assessed. The thickness of the coatings is 50-1000, preferably 50-200 .mu. the bond strength being phys. Thus, the penetration depth of a hardened ball in a 0.2 mm thick plasma-sprayed coating from FeCr45C4B1 [100293-08-1] on GGL-25 [39344-09-7] or hardened steel 100Cr6 [12725-40-5] depend on the load and substrate being 0.047-0.182 or 0.035-0.132 mm for gray iron or steel on loading with 625-2500 N. The structure and Vickers hardness of **coatings** from **Ni** 99.4, Al-40Ni [**12615-89-3**], WC-20Co [37193-29-6], and Al2O3 + TiO2 were detd. The structure of plasma-sprayed gas nitrided steel 35CrAl6 [76722-86-6] with **MPA** 551 (Ni-Cr-B-Si) [**82675-95-4**] was identified along with that of **metal coating** on phenolic resin substrate. The plasma coatings are used for improved sliding wear, microporous, self-lubricating or rough surface (for improved adhesion), and improved atm. and thermal corrosion. Applications include spindle bearing, journal, camshaft (rotation), flange, guide, and bearing (rotation and sliding).

L36 ANSWER 22 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1985:186394 HCAPLUS
DN 102:186394
TI Containers and pipes from reinforced plastics
IN Landa, Vaclav; Sucharda, Zbynek; Batik, Jan; Faldyn, Bohumir
PA Czech.
SO Czech., 3 pp.
CODEN: CZXXA9
DT Patent
LA Czech
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CS 215547	B	19820827	CS 1979-6267	19790918

AB Containers and pipes from glass fiber-reinforced epoxy or polyester laminates were sealed against leakage of gases and combustible liqs. by **Ni** or FeNi **coatings** electrodeposited from a galvanic bath at 25-60 A. The products resisted internal pressures of 35-65 **MPa**.

L36 ANSWER 23 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1984:477218 HCAPLUS
DN 101:77218
TI Production of amorphous iron-nickel based alloys by flame-spray quenching and **coatings** on **metal** substrates
AU Miura, Harumatsu; Isa, Shigeteru; Omuro, Keisuke
CS Dep. Iron Steel Eng., Iron Steel Tech. Coll., Amagasaki, 661, Japan
SO Trans. Jpn. Inst. Met. (1984), 25(4), 284-91
CODEN: TJIMAA; ISSN: 0021-4434
DT Journal
LA English
AB By using a flame deflector, the effectiveness of quenching was greatly increased, and amorphous flakes were easily obtained in quantities in an Fe39Ni39Si10B12 alloy [**84698-47-5**], relatively difficult to vitrify by the spray-quenching equipment without the flame deflector, as well as in all other alloys studied, Fe40Ni40P14B6 [**54319-71-0**], Fe16Ni64P14B6 [**91373-30-7**], and Fe13Ni64Cr3P14B6 [**91373-31-8**] alloys. In the Fe40Ni40P14B6 and Fe16Ni64P14B6 alloys, whose amorphous flakes were comparatively easy to prep., amorphous alloy sheets .apprx.450 .mu. thick were fabricated by successive building-up of amorphous flakes on the substrate without difficulty. By the present spray-quenching equipment, an amorphous coating .apprx.450 .mu.-thick of Fe40Ni40P14B6 and Fe13Ni64Cr3P14B6 could be applied to Cu and mild steel substrates. Although tensile adhesion strength of the coating-substrate interface for Cu was low, the strength for mild steel was .apprx.10-20 **MPa** and large enough to be comparable to that of the coating system obtained in the ordinary spray process.

L36 ANSWER 24 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1982:39526 HCAPLUS
DN 96:39526
TI Method of applying a ceramic **coating** to a **metal** workpiece
IN Driver, Donal William
PA Rolls-Royce Ltd., UK
SO Brit. UK Pat. Appl., 5 pp.
CODEN: BAXXDU
DT Patent
LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	GB 2060436	A	19810507	GB 1980-28316	19800902
	GB 2060436	B2	19840321		
PRAI	GB 1979-32941		19790922		

AB Adherent ceramic coatings were applied on alloys (esp. blades for gas-turbine engines) by heating the workpiece to >500.degree. (e.g., by a plasma gun), and plasma spraying the coating directly onto the surface before any oxide coating had formed thereon. The tensile stress on the ceramic coating at the working temp. was decreased by the prestressing effect thus induced. Thus, a Mar M002 [**57896-07-8**] Ni-superalloy turbine blade was heated to 600.degree. by a Metco 3MB plasma gun placed 16.5 cm from it in Ar. The plasma gun was moved to 6.5 cm from the blade, and Y2O3 and ZrO2 powders were fed to the gun to produce a coating contg. 80 ZrO2 and 20% Y2O3. The coating withstood thermal cycling from -20 to 1000.degree., and had adhesive strength of 30 **MPa**.

L36 ANSWER 25 OF 25 HCAPLUS COPYRIGHT 2002 ACS
AN 1978:515906 HCAPLUS
DN 89:115906
TI **Coating** of **metals**
AU Anon.
CS Engl.
SO Res. Discl. (1978), 170, 43
CODEN: RSDSBB
DT Journal
LA English
AB The EN42 [134052-14-5] steel clutch plate is electroless plated with Ni contg. .ltoreq.11% P to a thickness .ltoreq.0.001 in. Then, a bronze layer .ltoreq.0.050 in. thick is applied to the **Ni** bonding **layer** by flame spraying. Thus, the resulting bond strengths of the layers bonded by using a conventional **Ni**-Al **layer** and electroless deposited **Ni layer** were 12.1 and 13.9 **MPa**, resp.

L38 ANSWER 1 OF 2 HCAPLUS COPYRIGHT 2002 ACS
AN 1977:415004 HCAPLUS
DN 87:15004
TI Whisker inhibition of tin-base coatings on printed circuits
IN Bonkohara, Manabu
PA Nippon Electric Co., Ltd., Japan
SO Japan. Kokai, 2 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 52036529	A2	19770319	JP 1975-113447	19750918
JP 58021036	B4	19830426		

AB A metal surface is Sn-plated, then .gtoreq.1 metal(s) selected from Cu, Ag, Au, and Cd is deposited on the Sn **layer**, then the **metal**(s) is diffused into the Sn layer to give a Sn-base surface layer which does not form **Sn whiskers**. The method is esp. useful for Sn-base **metal** (or alloy) **coatings** on potential circuits, etc. Thus, a Cu plate was electroplated with 2-.mu. thick Sn from an electrolyte contg. SnCl2, NaOH, and glucose at 1.5 V, 2.0 A/dm2, then electroplated with 0.5-.mu. thick Cu from a pyrophosphate bath, and the plate was heated 30 min at 180.degree. in N to diffuse the Cu into the Sn layer: whisker formation was not obsd. even when the materials were tested by using whisker formation accelerating conditions.

L38 ANSWER 2 OF 2 HCAPLUS COPYRIGHT 2002 ACS
AN 1977:46531 HCAPLUS
DN 86:46531
TI Nickel-**tin alloy coating** on **metal**
IN Matsuwake, Yoshio
PA Alps Electric Co., Ltd., Japan
SO Japan. Kokai, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 51126338	A2	19761104	JP 1975-51650	19750428

AB A Ni-coated Fe, steel, Cu, or Cu alloy product heated above the m.p. of Sn is immersed in a molten salt bath contg. SnCl2, KCl, and optional chloride salts to form a corrosion-resistant Ni-**Sn alloy** coating. The method is used in elec. app. or electronic industries. Thus, a brass [12597-71-6] piece was electroless-coated with Ni, rinsed and dried, then immersed 1 min in a bath at 400 .+-. 5.degree. contg. SnCl2 and KCl to form a Sn-Ni alloy [**11110-83-1**] coating, rinsed and dried. The product did not tarnish for 4 years, but an electroplated Sn surface had **Sn whiskers** in 5 days.

L43 ANSWER 1 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:283445 HCAPLUS
DN 135:39191
TI Minimization of **tin whisker** formation for lead-free electronics finishing
AU Schetty, Rob
CS Shipley Co., LLC, Freeport, NY, USA
SO Circuit World (2001), 27(2), 17-20
CODEN: CIWODV; ISSN: 0305-6120
PB MCB University Press
DT Journal; General Review
LA English
AB A review with 13 refs. Many theories regarding whisker growth exist. It was demonstrated in a variety of ref. sources that **Sn whiskers** can form in both pure Sn and **Sn alloy** deposits. Conversely, an equal no. of claims exist in the literature demonstrating no whisker growth in the same types of deposits. The lack of an industry std. whisker test is a significant limitation in addressing **Sn whiskers**. Historically in the electronics industry, addn. of Pb was found to be an effective method of minimizing **Sn whisker** formation and so for many years electronic components were electroplated with Sn-Pb. With the advent of Pb-free electronics finishing, the risk of **Sn whiskers** is again a significant concern. This paper will review the theories behind whisker formation, identify the common characteristics of same, and demonstrate how Pb-free electroplating processes can be formulated to minimize the risk of whisker formation.
RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:706540 HCAPLUS
DN 133:290000
TI Electrolytic capacitors and fabrication thereof
IN Nakaaki, Kentaro; Tsuji, Tatsunori
PA Nippon Chemi-Con Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2000277383	A2	20001006	JP 1999-86363	19990329

AB The title fabrication involves electrodepositing an external terminals with 0.5-10.0 wt.% Bi-**Sn alloy** followed by welding the terminals to an Al ribetto to give welded portion doped with Bi. The use of the Bi-**Sn alloy** prevents generation of **Sn whiskers** out of the external terminals.

L43 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 2000:94387 HCAPLUS
DN 132:210698
TI Development of Pb free Zn-Sn-**Ni alloy** coated steel sheet for electric devices
AU Wake, Ryousuke; Yoshihara, Ryoichi; Uno, Yoshihide; Iwamoto, Yoshiaki
CS Tech. Dev. Div., Nippon Steel Corp., Japan
SO Materia (2000), 39(1), 87-89

CODEN: MTERE2; ISSN: 1340-2625
PB Nippon Kinzoku Gakkai
DT Journal
LA Japanese
AB The title coated steel sheet developed by the authors' is introduced. In order to raise corrosion resistance and to prevent the formation of **Sn whiskers** Ni, Sn, Zn multi layered plated sheet made by an electrolytic tinning line was alloyed by thermal diffusion at the Sn melting app.

L43 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1997:509498 HCAPLUS
DN 127:143965
TI Steel sheet having hot-dip Sn plating for electric apparatus parts
IN Kato, Hiroyuki; Yoshida, Keiji; Sagiyama, Masaru
PA Nippon Kokan Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 09195086	A2	19970729	JP 1996-7776	19960119

AB The title sheet comprises a steel sheet successively coated with a Sn coating layer composed of a Sn-Fe alloy layer and a pure Sn layer, and a chromate top coating layer; wherein [Ra (steel surface roughness) .gtoreq.0.25.mu.m, 0.5 .gtoreq. WT/Rad .gtoreq. 0.2, 0.50 .gtoreq. WA/WT .gtoreq. 0.20, WT (g/m2) = Sn plating amt., WA (g/m2) = **Sn alloy** amt., d (g/cm3) = d. of Sn]. By controlling the steel surface roughness and Sn- and **Sn alloy**-coating amt., generation of **Sn whisker** is prevented.

L43 ANSWER 5 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1995:941059 HCAPLUS
DN 124:35557
TI Novel process for titanium nitride whisker synthesis and their use in alumina composites
AU Revankar, V.; Hexemer, R.; Mroz, C.; Bothwell, D.; Goel, A.; Bray, D.; Blakely, K.
CS Advanced Refractory Technologies, Inc., Buffalo, NY, 14207, USA
SO Ceram. Trans. (1995), 56(Advanced Synthesis and Processing of Composites and Advanced Ceramics), 135-46
CODEN: CETREW; ISSN: 1042-1122
DT Journal
LA English
AB Single crystal ceramic whiskers are viewed as an important reinforcement for ceramic, metal and polymer matrix composites. Titanium nitride (TiN) exhibits high chem. stability in contact with ferrous and **nickel alloys**, and **TiN whiskers** (TiNw) are expected to find use in MMC's based on these alloys, as well as in CMC cutting tools for use. Historically the high cost of the whisker materials has prevented their widespread use. A novel, low cost, scalable process has been developed for the manuf. of titanium nitride whiskers. TiNw-Al2O3 composites fabricated using these whiskers are being evaluated as cutting tools inserts for ferrous metals. Characterization of ART's TiNw and initial composite results are presented. The use of TiNw in metal and polymer matrix composites is discussed.

L43 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1991:563663 HCAPLUS
DN 115:163663
TI Characteristics of nickel-tin-zinc alloy coated steel sheet by thermal diffusion method
AU Wake, Ryousuke; Yoshihara, Ryoichi; Kaneda, Yoshihiro; Yamamoto, Masahiro
CS Res. Dev. Lab., Nippon Steel Corp., Himeji, 671-11, Japan
SO Tetsu to Hagane (1991), 77(7), 898-905
CODEN: TEHAA2; ISSN: 0021-1575
DT Journal
LA Japanese
AB The alloy electroplating method by the thermal diffusion was developed to produce Ni-Sn-Zn alloy plated steels. This method consists of 2 processes. First, Ni, Sn and Zn triple layers were successively electroplated on the steel, and the electroplated layers were heated for diffusion. The alloy consists of the multi-component alloy layers, the surface consists of a Sn-Zn eutectic alloy, and the steel side consists of Zn-Ni and Sn-**Ni alloys**. The diffusion layers have some interesting properties, such as corrosion resistance in the salt spray and humidity tests, excellent solderability, and suppression of **Sn whiskers**. The thermal-diffused Ni-Sn-Zn alloy coated steel sheets (Ni = 0.4, Sn = 3.0, Zn = 0.5 g/m2) are com. used for the components of elec. appliances.

L43 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1991:461830 HCAPLUS
DN 115:61830
TI Resistance oscillations in thin single crystalline bismuth-**tin whiskers** under tensile extension
AU Bodyul, P. P.; Garabazhiu, V. F.; Kondrya, E. P.; Nikolaeva, A. A.
CS Inst. Prikl. Fiz., Kishinev, USSR
SO Fiz. Nizk. Temp. (Kiev) (1991), 17(2), 228-32
CODEN: FNTEDK; ISSN: 0132-6414
DT Journal
LA Russian
AB The dependence of oscillating resistivity on tensile extension is obsd. in thin (d < 2 .mu.m) cylindrical crystals of Bi-0.03 at. % **Sn alloy** at 4.2 K. The resistivity dependence is influenced by the sample diam., temp. and impurity concn. The nonmonoton. dependence of thin sample resistivity is due to size effect.

L43 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1990:206703 HCAPLUS
DN 112:206703
TI Whisker-free tin or **tin alloy** plated article and coating technique therefor
IN Shimauchi, Hidenori; Suzuki, Keijiro
PA Nippon Mining Co., Ltd., Japan
SO Eur. Pat. Appl., 10 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 346888	A1	19891220	EP 1989-110828	19890614
	EP 346888	B1	19940316		
	R: DE, FR, GB				
	JP 02004978	A2	19900109	JP 1988-146894	19880616

	JP 02004984	A2	19900109	JP 1988-146895	19880616
	US 4959278	A	19900925	US 1989-363615	19890608
PRAI	JP 1988-146772		19880616		
	JP 1988-146894		19880616		
	JP 1988-146895		19880616		

AB A Sn or **Sn alloy** plated article, particularly a film carrier, for mounting electronic components such as semiconductor chips, is protected against the generation of **Sn whiskers** by having an In plated layer on the substrate and a Sn or **Sn alloy** electro- or electrolessly plated layer on the In plated layer. A coating process and In plating bath, including an In salt and thiourea or its deriv., are also described.

L43 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1988:603320 HCAPLUS
DN 109:203320
TI Lead deposition baths, and method for the superficial exchange of a tin layer by a lead layer
PA N. V. Philips' Gloeilampenfabrieken, Neth.
SO Neth. Appl., 9 pp.
CODEN: NAXXAN
DT Patent
LA Dutch
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	NL 8700017	A	19880801	NL 1987-17	19870107
	EP 276518	A1	19880803	EP 1987-202642	19871229
	R: DE, FR, GB, NL				
	JP 63169389	A2	19880713	JP 1988-451	19880106
PRAI	NL 1987-17		19870107		

AB The Pb deposition baths, for superficially changing a Sn layer into a Pb layer, consist of an alk. soln. of a Pb(II) compd. and a complexing agent, whereby the Pb complex const. is smaller than the dissocn. const. of HPbO2-. The resulting surface layer is heat-treated at 183-232.degree. to form a Pb-**Sn alloy**. The cyanide in these baths has been replaced by a much less toxic substance, and the solderability of the layer is excellent. This method suppresses the formation of **Sn whiskers** on the tin-coated elec. circuits of printed circuit boards. A 30 .times. 10 .times. 3-mm electroless Sn plated Cu plate was exposed to the air for several days, treated in 1M NaOH at 85.degree. for 3 min, rinsed with water, and immersed for 1 min in an aq. soln. consisting of Pb(OAc)2 0.01, NaOH 1.18, EDTA Na salt 0.1, and SnCl2 0.05 mol/L, of 60.degree.. A 0.36-.mu.m-thick Pb layer had been formed, having a smoother surface than the initial Sn layer.

L43 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1987:559492 HCAPLUS
DN 107:159492
TI Whisker growth on tin electrodeposits
AU Gabe, D. R.
CS Dep. Mater. Eng. Des., Univ. Technol., Loughborough/Leics., LE11 3TU, UK
SO Trans. Inst. Met. Finish. (1987), 65(3), 115
CODEN: TIMFA2; ISSN: 0020-2967
DT Journal
LA English
AB The spontaneous growth of filamentary whiskers on Sn electrodeposits on printed circuit boards, caused elec. short circuiting. Whisker growth was inhibited by depositing barrier layers of Cu or Ni beneath Sn, using a Pb-

Sn alloy, or diffusion treating dull Sn electrodeposits.

L43 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1987:184944 HCAPLUS
DN 106:184944
TI Copper alloy strip for electric contacts
IN Mori, Toshihiko; Noguchi, Hiroyuki; Ogawa, Yoshiaki
PA Mitsubishi Electric Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 3 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 61284593	A2	19861215	JP 1985-127365	19850612

AB A method for fabricating a Cu alloy strip for elec. contacts involves the following steps: a electroplating a Cu strip selectively coated with a coating material with Cu to prep. an undercoat layer; (2) electroplating with Sn or its alloy; (3) removing the coating material; and (4) heating in an inert gas to melt the Sn or its alloy layer in order to prevent the formation of **Sn whisker**.

L43 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1986:410504 HCAPLUS
DN 105:10504
TI Tin-lead alloy coatings
IN Kubo, Mitsuyasu; Murakami, Toru
PA Uyemura, C., and Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 60238500	A2	19851127	JP 1984-92199	19840509
JP 63016477	B4	19880408		

AB Substrates are electroplated in Sn or **Sn alloy** baths contg. dispersed Pb metal and/or water-insol. Pb compd. The coatings have eutectic dispersion of Pb, and are optionally heated to give a Sn-Pb alloy layer for high solderability. Thus, powd. Pb was dispersed in an electroplating soln. contg. SnSO4, H2SO4, 2-naphthol-ethylene oxide (10 mol) adduct, benzalacetone, and m-cresolsulfonic acid. A brass specimen was electroplated 5 min at cathode c.d. 3 A/dm2 to give a Sn composite coating having 10% eutectic Pb. The coating kept 2 yr at room temp. did not form **Sn whiskers**.

L43 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1984:540778 HCAPLUS
DN 101:140778
TI Failure modes of indium gallium arsenide phosphide (InGaAsP)/indium phosphide (InP) lasers due to adhesives
AU Fukuda, Mitsuo; Fujita, Osamu; Iwane, Genzo
CS Electr. Commun. Lab., Nippon Telegr. and Teleph. Public Corp., Atsug, 243-01, Japan
SO IEEE Trans. Compon., Hybrids, Manuf. Technol. (1984), CHMT-7(2), 202-6
CODEN: ITTEDR; ISSN: 0148-6411
DT Journal

LA English
AB Sudden failure modes for (In,Ga)(As,P)/InP lasers were obsd. during aging. Growth of **Sn whiskers**, formation of voids between the heat sink and package stem, sepn. of metalized metal from the diamond heat sink, and reaction of solder material with the laser chip were obsd. Since they induce sudden failure, the choice of bonding solders and metals for heat sink metalization is very important to obtain highly reliable lasers. A Au-rich Au-**Sn alloy** was the most stable solder against the sudden failures among Sn, Sn-rich Au-Sn, Pb-Sn, and Au-rich Au-Sn.

L43 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1984:519403 HCAPLUS
DN 101:119403
TI Prevention of formation of **tin whiskers**
PA Mitsubishi Electric Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 3 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 59031886	A2	19840221	JP 1982-141493	19820812

AB A method for preventing formation of **Sn whiskers** involves formation of a thin Pb film (.gtoreq.0.05 .mu.m) after conventionally plating a substrate metal with Sn. Optionally, the Pb film may be formed by electroplating, electroless plating, evapn. deposition, or sputtering. Alternatively, a region contg. a high concn. of ion-implanted and diffused Pb or a Pb-**Sn alloy** thin film contg. Pb .gtoreq.5% may be used as the thin Pb film. Thus, a brass substrate was plated with Sn using a plating bath contg. a brightener and then with Pb. No whiskers were obsd. after 2 yr.

L43 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1984:59336 HCAPLUS
DN 100:59336
TI Some aspects of bonding-solder deterioration observed in long-lived semiconductor lasers: solder migration and whisker growth
AU Mizuishi, Kenichi
CS Cent. Res. Lab, Hitachi, Ltd., Kokubunji, 185, Japan
SO J. Appl. Phys. (1984), 55(2), 289-95
CODEN: JAPIAU; ISSN: 0021-8979
DT Journal
LA English
AB Catastrophic degrdn., called sudden failure (SF), that is obsd. in both (Al,Ga)As/GaAs and (In,Ga)(As,P)/InP double-heterostructure lasers is discussed. The SF obsd. here is not assocd. with elec. surge effects and appears unexpectedly in the middle of long-term, stable operation. This type of SF can be caused by aging-induced metallurgical deterioration at the interfacial bonding solder layer. Among the metallurgical deteriorations obsd. were (1) solder migration into the laser crystal due to current-induced local heating near the end mirror of the laser, (2) In whisker growth due to electromigration in In solder, and (3) **Sn whisker** growth, when using an Au-**Sn alloy** as solder, due to strain relaxation. All of these effects cause SF. Countermeasures against these deteriorations are described and some successful results are presented.

L43 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1982:147631 HCAPLUS
DN 96:147631
TI Stress-extension behavior of copper-**tin alloy** whiskers
AU Nohara, Akira; Yonezawa, Noboru; Imura, Toru
CS Fac. Eng., Nagoya Univ., Nagoya, 464, Japan
SO Jpn. J. Appl. Phys., Part 1 (1982), 21(1), 194-5
CODEN: JAPNDE; ISSN: 0021-4922
DT Journal
LA English
AB Cu-**Sn alloy** whiskers were prepd. by reducing a CuI-SnCl2 powder mixt. in flowing H for 2 H at 630.degree.. The deformation behavior fell into 2 groups (1) [100], [110], and [111] whisker which exhibited extensive plastic deformation (2) .alpha.-solid soln. whiskers contg. Cu6Sn5 [12019-69-1] which had a high upper yield point and fractured immediately after yielding.

L43 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1982:96329 HCAPLUS
DN 96:96329
TI Tin-**nickel alloy** coating
PA Alps Electric Co., Ltd., Japan
SO Jpn. Tokkyo Koho, 3 pp.
CODEN: JAXXAD
DT Patent
LA Japanese
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 56032392	B4	19810727	JP 1975-21615	19750221

AB A wear-proof material with a Sn-**Ni alloy** layer is obtained by dipping a material (e.g. a steel plate) with a Sn layer in an acidic Ni salt aq. soln. contg. Cl ions, and chem. alloying the surfaces of the Sn layer. The Sn-**Ni alloy** has improved solder wettability and prevents growth of **Sn whiskers**.

L43 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1979:601124 HCAPLUS
DN 91:201124
TI Reflowing of lead-tin deposits
AU Gerstberger, H. A.; Strube, G.
CS Fed. Rep. Ger.
SO Galvanotechnik (1979), 70(10), 961-5
CODEN: GVTKAY; ISSN: 0016-4232
DT Journal
LA German
AB The use of the title process in the making of printed circuits was studied. A Pb-Sn electroplate rather than Sn was selected because of the **Sn whisker** formation and the so-called Sn pest. Using a photoresist technique the Cu plate is electroplated with the Pb-**Sn alloy** according to the pattern desired. The etching is carried out and the Pb-Sn remains on the ridges of the Cu plate with the Cu sides exposed with the Pb-Sn overhanging. By use of the reflow method the Pb-Sn overhang drops to protect the exposed Cu.

L43 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1976:129426 HCAPLUS
DN 84:129426
TI The influence of the mean free path on the current induced

superconducting/normal conducting transition of **tin whiskers** with indium impurities
AU Meyer, J. D.; Tidecks, R.
CS I. Phys. Inst., Univ. Goettingen, Goettingen, Ger.
SO Solid State Commun. (1976), 18(3), 305-7
CODEN: SSCOA4
DT Journal
LA English
AB The current-induced step-like structure in the current-voltage (I-V) characteristics of **Sn whiskers** with In impurities .ltoreq.4 at.% shows a zero voltage intercept Io of approx. 0.5 Ic. This current can be explained by the existence of phase slip centers above the crit. current (Ic) which carry a time averaged supercurrent of .apprx.0.5 Ic. From the differential resistance assocd. with the first step a "healing length" Ln proportional to l1/2 (l is the mean free path) was obtained which can be related to the quasiparticle diffusion length .LAMBDA. introduced by Tinkham et al (1974) in the explanation of temp. independent nonequil. processes between pairs and quasiparticles at a phase slip center.

L43 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1972:78197 HCAPLUS
DN 76:78197
TI Fluctuation effects in the resistive transition of thin filamentary superconductors
AU Warburton, R. J.; Patton, B. R.; Webb, W. W.; Wilkins, J. W.
CS Lab. At. Solid State Phys., Cornell Univ., Ithaca, N. Y., USA
SO Physica (Utrecht) (1971), 55, 324-38
CODEN: PHYSAG
DT Journal
LA English
AB Measurements of the resistive transitions in Sn and Sn-In alloy whisker crystals show results that can be fitted reasonably well from the onset at low temp. through the excess cond. tail above the crit. temp. by application of existing theories of intrinsic fluctuations. The breadth of the transitions seems to be quant. accounted for. The theory of J. Langer and V. Ambegaokar (1967) as modified by D. E. McCumber and B. I. Halperin is applicable at the lowest voltage portion of the onset of the transitions, at least in pure Sn crystals, and the L. G. Aslamazov-A. I. Larkin (1968) theory is applicable at the high-temp. tail in alloy crystals. The current dependence of the voltage at Tc and the entire transition shape for alloy whiskers fits a scheme of W. E. Masker, et al. (1969), based on the time-dependent Ginzburg-Landau equations.

L43 ANSWER 21 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1970:59993 HCAPLUS
DN 72:59993
TI Growth mechanism of proper **tin-whisker**
AU Furuta, Noboru; Hamamura, Kenji
CS Dep. Phys., Tokyo Gakugei Univ., Tokyo, Japan
SO Jap. J. Appl. Phys. (1969), 8(12), 1404-10
CODEN: JJAPA5
DT Journal
LA English
AB Growing processes of **Sn whiskers** out of the Sn phase of Al-**Sn alloy** we re investigated. The particular distribution of angular bends obsd. in kinked **Sn whiskers** and the formation of kinks are explained by the following 2 assumptions: (1) the incoherent boundary between the **Sn**

whisker and the parent material of the Sn phase corresponds to the so-called coincidence site boundary, and (2) on this coincidence site boundary whiskers cause a boundary slip on account of a stress unbalance occurring at the root of the whiskers during growth. Meanwhile, the crystn. growth concept proposed by Ellis, et al. (1958) is modified, and thereby the growing process of the whiskers is discussed theoretically. The growth rate of the whiskers is proportional to the strain energy in the parent material and does not depend on its thickness, and the max. thickness of the whiskers is inversely proportional to the strained energy. These conclusions agree with the exptl. results.

L43 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1969:51432 HCAPLUS
DN 70:51432
TI Crystal texture of **tin whiskers**
AU Hamamura, Kenji; Furuta, Noboru
CS Tokyo Gakugei Univ., Koganei, Japan
SO Tokyo Gakugei Daigaku Kiyo, Dai-4-Bu (1968), 19(2), 94-101
CODEN: TGDSBH
DT Journal
LA Japanese
AB The crystal texture of **Sn whiskers** grown from a Sn 50 wt. %-Al alloy was investigated by electron diffraction. Growth directions of the whiskers are not always along the slip direction. Both straight and naturally kinked whiskers are single crystal. Artificially kinked whiskers were formed by blowing air on straight whiskers. No essential differences were found between the crystal textures of artificially and naturally kinked whiskers.

L43 ANSWER 23 OF 23 HCAPLUS COPYRIGHT 2002 ACS
AN 1965:47613 HCAPLUS
DN 62:47613
OREF 62:8449b-c
TI Growing kinked **tin whiskers**
AU Furuta, Noboru
CS Univ. Tokyo
SO Japan. J. Appl. Phys. (1965), 4(2), 155-6
DT Journal
LA English
AB Two types, A and B, of growth processes were observed in kinked **Sn whiskers** grown, at room temp., from a rapidly cooled Al-**Sn alloy** (Al-20 wt. % Sn). In the A-type, the successive segments were co-planar and the growth rate was nearly const. and approx. equal to that of the straight whisker; the kinked angles were predominantly .apprx.30.degree., and in this case the pos. and neg. angles were repeated alternatively. In the B-type, the successive segments were noncoplanar and the growth rate was faster than in the straight whiskers; the kinked whiskers were formed by a sharp mech. bending at the base of an already formed whisker; the growth direction at the base remained unchanged, and the kinked angle was predominantly .apprx.90.degree..

L44 ANSWER 1 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 2002:236409 HCAPLUS
DN 136:235612
TI Process for whisker-free aqueous electroless tin plating of copper or copper alloys
IN Bokisa, George S.; Bishop, Craig V.; Kochilla, John R.
PA Atotech Deutschland G.m.b.H., Germany
SO U.S., 13 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6361823	B1	20020326	US 1999-454023	19991203
US 2002064676	A1	20020530	US 2001-2714	20011101
PRAI US 1999-454023	A3	19991203		

AB A plating process with preserving solderability and inhibiting **tin whisker** growth of exposed copper or copper alloy surfaces on a substrate comprises the steps of prepg. an immersion tin plating soln. free of other immersion-platable **metals**; applying the tin plating soln. to the substrate to form a tin coating; prepg. an immersion alloy plating soln. contg. at least two **metals**; applying the immersion alloy plating soln. to the substrate by immersing the substrate in the soln. to form an alloy cap layer on the tin coating. The **metals** in the immersion alloy plating soln. may be at least two **metals** selected from Sn, Ag, Bi, Cu, Ni, Pb, Zn, In, Pd, Pt, Au, Cd, Ru, and Co. The immersion platable **metals** may be added to the soln. in the form of **metal** salts of hydrocarbyl-substituted sulfonic acids, carboxylic acids, or mineral acids. In one embodiment, the plating alloy comprises Sn 90-95% and the balance - Ag.
RE.CNT 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 2 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:127355 HCAPLUS
DN 134:288610
TI Superconducting transition of single-crystal tin microstructures
AU Arutyunov, K. Yu.; Ryynanen, T. V.; Pekola, J. P.; Pavolotski, A. B.
CS Department of Physics, University of Jyvaskyla, Jyvaskyla, 40351, Finland
SO Physical Review B: Condensed Matter and Materials Physics (2001), 63(9), 092506/1-092506/4
CODEN: PRBMDO; ISSN: 0163-1829
PB American Physical Society
DT Journal
LA English
AB Single-crystal superconducting microstructures were fabricated. The resistances of **tin whiskers** were measured in a multiprobe configuration. Contacts were made of copper, gold, or niobium films using e-beam lithog. followed by a lift-off process. Structures with normal **metal** probes showed unusual behavior: below the crit. temp. of bulk tin, the resistance decreases in distinct steps and does not reach zero even when cooled down to 1 K The origin of these phenomena is not clear but is likely related to a proximity effect.
RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L44 ANSWER 3 OF 18 HCAPLUS COPYRIGHT 2002 ACS

AN 1998:643023 HCAPLUS
DN 129:349431
TI Elimination of whisker growth on tin plated electrodes
AU Endo, M.; Higuchi, S.; Tokuda, Y.; Sakabe, Y.
CS Murata Mfg. Co., Ltd., Yasu-gun, Shiga, 520-23, Japan
SO ISTFA '97, Proceedings of the International Symposium for Testing and Failure Analysis, 23rd, Santa Clara, Calif., Oct. 27-31, 1997 (1997), 305-311 Publisher: ASM International, Materials Park, Ohio.
CODEN: 66TPAK
DT Conference
LA English
AB At the surface of the tin-plated brass substrate placed at 50.degree.C, the **tin whiskers** grew evidently within a short time, due to the formation of zinc oxide on the surface and alloying between plated tin and brass substrate as supposed. While at the surface of the brass substrate plated with tin on nickel, there was no trace of the **tin whisker** at all. Nickel greatly represses the diffusion of base **metal** materials into the tin layer. Nickel and tin plated monolithic chip capacitors placed at the same condition for 18 yr were also obsd. and the **tin whisker** growth phenomenon has never taken place either. As a result, the tin plated film on the nickel over silver thick film does not provide the **tin whisker** growth. Nickel underplating plays an important role in tin plated capacitors for not only the solder leaching but also the **tin whisker** growth problems.

L44 ANSWER 4 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1993:676459 HCAPLUS
DN 119:276459
TI Effect of additives in organic acid bath for electroless solder plating. Studies of complexing agents
AU Yuasa, Makoto; Matsumoto, Katsuyuki; Masuda, Akihiro; Kumeuchi, Tomokazu; Sugiyama, Takashi; Sekine, Isao; Yoshioka, Osamu; Chinda, Akira
CS Fac. Sci. Technol., Sci. Univ. Tokyo, Noda, 278, Japan
SO Hyomen Gijutsu (1993), 44(9), 742-7
CODEN: HYGIEX; ISSN: 0915-1869
DT Journal
LA Japanese
AB The effect of complexing agents in org. acid baths in displacement soldering to form solder films with Sn/(Sn + Pb) molar fraction of 0.8-0.9 was investigated by using physiochem. methods. A useful film was obtained from a basic bath composed of **metal** salts of Sn and Pb, org. acid, thiourea complexing agent, and surfactant of laurylpyridinium chloride with the Sn/(Sn + Pb) molar fraction being 0.50. The effective first complexing agent in the compds. contg. S had a C=S group such as thiourea and its derivs. Formation of **Sn whiskers** on the film was depressed by adding a second complexing agent glycine to the bath. The working efficiency, deposition rate and lifetime, of baths contg. glycine was similar or superior to those without glycine.

L44 ANSWER 5 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1993:413642 HCAPLUS
DN 119:13642
TI Prevention of whisker formation on tin-coated copper alloy surface
IN Kurihara, Hiroaki
PA Mitsui Mining & Smelting Co, Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent

LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 05033187	A2	19930209	JP 1991-207236	19910725
	JP 3014814	B2	20000228		

AB The whisker formation is prevented by precoating the Cu or Cu-alloy surface or patterns with Sn layer .gtoreq.0.15 .mu.m thick, annealing to form Cu-Sn diffusion layer, and coating with another Sn layer 0.15-0.8 .mu.m thick. The whiskers are prevented at a decreased cost with no need to introduce other **metals**.

L44 ANSWER 6 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1989:100113 HCAPLUS
DN 110:100113
TI Composite with carbonitride whiskers for improved toughness
IN Brandt, Gunnar; Senesan, Zeljka
PA Sandvik AB, Swed.
SO Eur. Pat. Appl., 6 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 289476	A2	19881102	EP 1988-850144	19880426
	EP 289476	A3	19900321		
	EP 289476	B1	19940706		
	R: AT, CH, DE, FR, GB, IT, LI, SE				
	US 4915734	A	19900410	US 1988-186310	19880426
	JP 63286551	A2	19881124	JP 1988-104395	19880428
PRAI	SE 1987-1791		19870429		

AB The composite contains 5-50 vol.% hard whiskers to improve toughness; 25-82 vol.% hard carbide and/or nitride phases of **metals** from Group IVB, VB, and/or VIB; and 3-25 vol.% Fe, Co, and/or Ni binder. The whisker materials are selected from nitrides, carbides, and carbonitrides of Ti, Zr, and/or Hf. The whiskers are weakly bonded to the alloy structure, and promote crack deflection along their interface. Thus, **TiN whiskers** having typical diam. of 0.5-2 and length 20-100 .mu.m were manufd. in a reactor by chem.-vapor deposition on a Ni sponge substrate at 1200.degree.. Carbonitride alloy composite contg. 30 vol.% **TiN whiskers** was manufd. by sintering a preformed mixt. for 1 h at 1550.degree. and 10 torr N. Fracture toughness rating was 10.2 for the alloy composite (contg. TiC 35, TaC 2, VC 4, Mo2C and WC 5 each, TiN 10, **TiN whiskers** 30, Co 6, and Ni 3 vol.%), compared with 7.4 for the conventional sintered alloy of similar compn. with 40 vol.% TiN as powder. The alloy composite was suitable for tips in cutting of steel.

L44 ANSWER 7 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1987:469145 HCAPLUS
DN 107:69145
TI Prevention of whisker growth in tin coating
PA Olin Corp., USA
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 62077481	A2	19870409	JP 1986-182875	19860805
	US 4749626	A	19880607	US 1986-879118	19860703
PRAI	US 1985-762177		19850805		
	US 1986-879118		19860703		

AB In preventing the growth of **Sn whiskers** on a substrate having a Sn coating, a preliminary Sn-coating soln. is prepd., and a salt of a **metal** from Pd, Ag, Ni, Fe, Cd, Pt, Au, In, Ru, or Co is added to the soln. while maintaining its d. higher than its satn. d. The use of the soln. can achieve the purpose without lowering the quality of the Sn coating.

L44 ANSWER 8 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1981:74012 HCAPLUS
DN 94:74012
TI Observation of the **tin whisker** by micro-Auger electron spectroscopy
AU Fujiwara, Kenzo; Kawanaka, Ryusuke
CS Cent. Res. Lab., Mitsubishi Electr. Corp., Hyogo, 661, Japan
SO J. Appl. Phys. (1980), 51(12), 6231-2
CODEN: JAPIAU; ISSN: 0021-8979
DT Journal
LA English
AB An observation by micro-Auger electron spectroscopy was made of the **Sn whisker** grown on electroplated Sn films. Direct exptl. evidence was obtained for the existence of Zn and O impurities on **Sn whiskers** as well as on the electroplated film surfaces when a brass or Zn-coated **metal** is used as a substrate. The localization of these impurities on these surfaces may be related to the growth mechanism of **Sn whiskers** or to the driving force by lowering the surface energy.

L44 ANSWER 9 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1981:23381 HCAPLUS
DN 94:23381
TI Whisker formation in tin, tin-lead alloys, silver and gold
AU Jostan, J. L.
CS Forschungsinst., AEG-Telefunken, Ulm, D-7900, Fed. Rep. Ger.
SO Galvanotechnik (1980), 71(9), 946-55
CODEN: GVTKAY; ISSN: 0016-4232
DT Journal; General Review
LA German
AB A review with more than 100 refs. on whisker formation and its prevention in printed circuits and electronic devices.

L44 ANSWER 10 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1980:456775 HCAPLUS
DN 93:56775
TI The growth of **tin whiskers**, and methods for its suppression
AU Hasegawa, Tomoharu; Murata, Yasuhiro; Kawanaka, Ryusuke; Nango, Shigeyuki
CS Mitsubishi Electr. Corp., Kamakura, Japan
SO Mitsubishi Denki Giho (1979), 53(11), 781-5
CODEN: MTDNAF; ISSN: 0369-2302
DT Journal
LA Japanese
AB The factors effecting the growth of whisker were studied. The effects of brightener in the plating bath, thickness of plating, base **metal**

, atm., and annealing were obsd. Brighteners of the ketone series, and plate thickness suppressed the growth of whiskers. On base **metal** , whiskers were obsd. for Sn plates on brass, and decreased in the following order: phosphor bronze, Cu contg. Sn, deoxidize Cu, Kovar, iron Ni plates on brass. Annealing at 125.degree. suppressed the growth of whiskers.

L44 ANSWER 11 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1979:113106 HCAPLUS
DN 90:113106
TI Catalytic effects of various materials on the growth of titanium nitride whiskers by chemical vapor deposition
AU Hagimura, Atushi; Tamari, Nobuyuki; Kato, Akio
CS Fac. Eng., Kyushu Univ., Fukuoka, Japan
SO Nippon Kagaku Kaishi (1979), (1), 49-56
CODEN: NKAKB8; ISSN: 0369-4577
DT Journal
LA Japanese
AB The growth of **TiN whiskers** from the TiCl4-H2-N2 system was investigated on various **metals** and refractory oxides. Ni, Pd, Pt, Ag, Si, and mullite porcelain were effective for the growth of **TiN whiskers**. **TiN whiskers** grew at 900-1250.degree. on Ni, Pd, Pt, Ag, and Si and at 1300-1400.degree. on mullite. **TiN whiskers** grew preferentially in the .ltbbrac.111.rtbbrac. direction on mullite. On Ni, most whiskers grew in the .ltbbrac.100.rtbbrac. direction and a part of whiskers grew in the .ltbbrac.112.rtbbrac. direction. The growth rate in the axial direction showed max. against both TiCl4 and N2 concns. The growth rate increased with H2 concn. Small globes contg. Ni were obsd. on the tips of whiskers at the initial stage of TiN growth on Ni. The similar globes were obsd. on the **TiN whiskers** grown on Pd and Pt. **TiN whiskers** on Ni grow by the vapor-liq.-solid mechanism at the initial stage with subsequent growth by the vapor-solid mechanism. The growth on mullite seems to occur by the vapor-solid mechanism from the initial stage.

L44 ANSWER 12 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1977:459913 HCAPLUS
DN 87:59913
TI Whisker growth from a bright acid tin electrodeposit
AU Zakraysek, Louis
CS Electron. Lab., Gen. Electr., Syracuse, N. Y., USA
SO Plat. Surf. Finish. (1977), 64(3), 38-43
CODEN: PSFMDH
DT Journal
LA English
AB Spontaneous growth of **metal** whiskers from an electroplated Sn surface is a phenomenon that can seriously affect the reliability of electronic circuits contg. densely-packed, noninsulated conductors. The growth of high-purity, single crystal Sn filaments was found to cause shorting in low-voltage circuits carrying .ltoreq.10 mA. The insidious nature of whisker growth appears dependent upon an incubation period for growth to begin and on the presence of internal stress for growth to progress. Although data on the phys. nature and morphol. of whiskers are well-developed, there is less agreement on the effect of electroplating process variables. The effect is reported that process variables have on the growth of whiskers from a bright acid Sn electroplated finish. Also studied was the renewed growth of **Sn whiskers** on a sensitized deposit from which an initial crop has been removed. The study

includes an evaluation of mech., thermal and chem. whisker removal methods as well as the detn. of the incidence of regrowth and of regrowth rates.

L44 ANSWER 13 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1976:552653 HCAPLUS
DN 85:152653
TI Effect of a normal-**metal** coating on the phase diagram of a superconducting microcylinder
AU Shabl, A. A.; Tyurin, S. A.; Dmitrenk, I. M.
CS Fiz.-Tekh. Inst. Nizk. Temp., Kharkov, USSR
SO Fiz. Nizk. Temp. (Kiev) (1976), 2(5), 582-8
CODEN: FNTEDK
DT Journal
LA Russian
AB An exptl. study was made of the crit. parameters for continuous cylinders of small diam. of Sn coated with a **metal** (b < 0), and the results are compared with theor. calcns. The study was made with whisker crystals of Sn coated with Ag. The coating, characterized by the extrapolation length b, changes the nature of formation of the superconducting phase in the sample. For small values of b the oscillations in the dependence Hc3 (surface crit. field) = f(T) disappear, and the field for the onset of supercond. is the same as that for the solid sample.

L44 ANSWER 14 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1972:410567 HCAPLUS
DN 77:10567
TI Deformation twinning in zinc, tin, and bismuth single-crystal whiskers
AU Overcash, D. R.; Stillwell, E. P.; Skove, M. J.; Davis, J. H.
CS Dep. Phys., Clemson Univ., Clemson, S. C., USA
SO Phil. Mag. (1972), 25(6), 1481-8
CODEN: PHMAA4
DT Journal
LA English
AB In whiskers of Zn, Sn, and Bi, it is possible, by application of axial tension, to nucleate a twinned region and pass the twin boundaries the length of the crystal. Nucleation and propagation stresses for twinning in whiskers were found. The completely twinned crystal will withstand the large stresses characteristic of perfect whiskers.

L44 ANSWER 15 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1971:411341 HCAPLUS
DN 75:11341
TI Spontaneous growth of whiskers from electrodeposited coatings
AU Glazunova, V. K.; Gorbunova, K. M.
CS Inst. Phys. Chem., Moscow, USSR
SO J. Cryst. Growth (1971), 10(1), 85-90
CODEN: JCRGAE
DT Journal
LA English
AB Whisker growth from electrodeposited Sn was investigated. The inclusion of foreign **metal** atoms and the existence of internal stresses in the coating were the factors that led to the growth of the whiskers. The thermal treatment of the deposits and the action of ultrasonic waves prevent whisker growth. The mechanism of internal stress relaxation in connection with growth is discussed.

L44 ANSWER 16 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1970:483107 HCAPLUS

DN 73:83107
TI Effect of the basic material to the whisker formation on electroplated coatings
AU Eollos-Szolga, Terezia; Balassa-Magos, Katalin; Kerkay-Nagy, Erzsebet
CS Gen. Mach. Des. Office, Budapest, Hung.
SO Corros. Week, Manifestation Eur. Fed. Corros., 41st (1970), Meeting Date 1968, 162-8. Editor(s): Farkas, T. Publisher: Akad. Kiado, Budapest, Hung.
CODEN: 17WTAX
DT Conference
LA English
AB **Metals** most likely to show whisker formation at room temp. are Sn, Zn, and Cd after electroplating. X-ray diffraction tests show that Zn and Cd whiskers are single crystals in which the c axis of the close packed hexagonal structure is parallel to the length of the whisker. **Sn whiskers** are tetragonal. The growth rate is higher on thinner coatings and at higher temps. (50.degree.). There is a decrease in whisker formation in the presence of Sb, Cu, Ge, Pb, and Ni. At 7500 psi pressure, the growth rate of **Sn whiskers** is 10 times that of spontaneous growth. The presence of polyethylene also enhanced whisker growth, but its role remains to be clarified.

L44 ANSWER 17 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1969:90141 HCAPLUS
DN 70:90141
TI Formation of whiskers in vapor-deposited tin
AU Politycki, Alfred; Kehrer, Hans Peter
CS Forschungslab., Siemens A.-G., Munich, Ger.
SO Z. Metallk. (1969), 60(1), 17-21
CODEN: ZEMTAE
DT Journal
LA German
AB Sn was vapor deposited under vacuum on substrates such as Cu, glass, and plastic cooled with liq. N to keep the temp. below 60.degree.. The Sn layers obtained, .ltoreq.5000 A. thick, showed during subsequent aging at 60.degree. very little whisker formation. However, the whisker growth during aging could be improved considerably by adding small amts. of O (.apprx.10-4 torr) during the vapor-deposition step. The incorporation of **metal** oxide in the deposited layers leads to the pinning of the grain boundaries. Application of transmission electron microscopy to vapor-deposited Sn layers 3-400 A. thick revealed that the whiskers grew from hollow bulges .apprx.1 .mu. in diam., believed to be a prerequisite for whisker formation. The whiskers displayed Kikuchi lines, indicating single crystals with an undisturbed lattice. The bulge formation observed is probably caused by the liberation of trace amts. of previously dissolved gases, therefore, in analogy with the observed whisker formation on electrolytically deposited layers where H is always present. The assumption that dissolved gases play an active role in whisker growth is further enhanced by the observation that Sn vapor-deposited on previously degassed substrates displayed very little whisker formation.

L44 ANSWER 18 OF 18 HCAPLUS COPYRIGHT 2002 ACS
AN 1968:470963 HCAPLUS
DN 69:70963
TI Growth of **tin whiskers**
AU Politycki, Alfred; Kehrer, Hans Peter
CS Forschungslab., Siemens A.-G., Munich, Ger.
SO Z. Metallk. (1968), 59(4), 309-13
CODEN: ZEMTAE

DT Journal
LA German
AB Various parameters were investigated to shorten the incubation period of **Sn whisker** growth from electrolytically deposited Sn followed by aging in air at 50-60.degree.. Esp. effective was a high concn. of org. brightener in the electrolytic Sn bath kept at 40.degree. and Cu as matrix **metal** previously .apprx.30% deformed. In this way the incubation period for the start of whisker growth could be cut from several weeks to a few hrs. Microscopic investigation of the actual growth process revealed that whisker growth occurred from the bottom, therefore corroborating previous findings (cf. S. E. Koonce and S. M. Arnold, 1953). Electron microscopy showed that the **Sn whiskers** were hollow and coated on the outside with a layer of SnO2 .apprx.100 A. thick. Of the many theories for whisker growth, the one proposed by W. C. Ellis, et al. (1958), is most suitable for explaining the phenomena observed. According to this theory, a Sn seed crystallite is blocked by grain boundaries, and therefore can grow in whisker form out of the **metal** surface.

L49 ANSWER 1 OF 6 HCAPLUS COPYRIGHT 2002 ACS
AN 2001:309242 HCAPLUS
DN 135:95872
TI A mechanistic study of oxidation-induced degradation in a plasma-sprayed thermal barrier coating system. Part I: model formulation
AU Busso, E. P.; Lin, J.; Sakurai, S.; Nakayama, M.
CS Department of Mechanical Engineering, Imperial College, London, SW7 2BX, UK
SO Acta Materialia (2001), 49(9), 1515-1528
CODEN: ACMAFD; ISSN: 1359-6454
PB Elsevier Science Ltd.
DT Journal
LA English
AB The effect of the oxidn. induced degrdn. of a typical plasma-sprayed thermal barrier coating (PS-TBC) system on the local ceramic-metal interfacial stresses responsible for the nucleation of mesoscopic cracks is investigated. A coupled oxidn.-constitutive approach is proposed to describe the effect of the phase transformations caused by local internal and external oxidn. processes on the constitutive behavior of the metallic coating. The coupled constitutive framework is implemented into the finite element method and used in parametric studies employing periodic unit cell techniques. The effects of service, microstructural and ceramic-metal interface parameters on the peak interfacial stresses during service and cooling to room temp. are quantified. The results of the parametric unit cell FE analyses revealed a strong dependency of the local stresses responsible for mesoscopic crack nucleation and growth on the local morphol. of the oxidized interface, the sintering of the ceramic coating, stress relaxation effects due to creep, the thickness of the thermally grown oxide (TGO), and the applied mech. loads. When no mech. straining of the TBC system is considered, local **tensile stresses** normal to the coating surface within the ceramic top coating reach values of up to 330 MPa at room temp. for a crit. TGO thickness of approx. 3 .mu.m.
RE.CNT 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L49 ANSWER 2 OF 6 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:413831 HCAPLUS
DN 131:173369
TI Mechanical behavior of PVD- and CVD-**coated** hard **metals** under cyclic loads
AU Schlund, P.; Kindermann, P.; Sockel, H.-G.; Schleinkofer, U.; Heinrich, W.; Gorting, K.
CS Institut fur Werkstoffwissenscrhaften, Universitat Erlangen-Nurnberg, Erlangen, D-91058, Germany
SO International Journal of Refractory Metals & Hard Materials (1999), 17(1-3), 193-199
CODEN: IRMME3; ISSN: 0263-4368
PB Elsevier Science Ltd.
DT Journal
LA English
AB Effect of the phys.-vapor deposition (PVD) and chem.-vapor deposition (CVD) coatings and layer systems on fatigue strength was evaluated for sintered P4M as the WC-6% **Co alloy** addnl. contg. 8% of Ti-Ta-Nb-W carbides. The carbide alloy specimens were coated by PVD with TiN 3 .mu.m thick, or by high-temp. CVD with the TiN-Ti(C,N)-TiN layer system 9 .mu.m thick. Fatigue strength of the coated specimens was detd. under increasing and cyclic loads at room temp., the microstructure was

evaluated by electron microscopy, and internal stress was detd. by X-ray anal. Fatigue life of the CVD-coated specimens was decreased in comparison to the bare specimens, in assocn. with residual **tensile stress** in the brittle coating. The PVD-coated specimens showed residual compressive stress in the coating that decreased the sensitivity to fatigue damage. The test results are applicable to service life of the sintered alloy cutting tools.

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L49 ANSWER 3 OF 6 HCAPLUS COPYRIGHT 2002 ACS
AN 1999:316532 HCAPLUS
DN 130:315164
TI Method for forming a spalling-resistant alumina protective coating on cobalt- and nickel-based superalloys
IN Vakil, Himanshu Bachubhai
PA General Electric Company, USA
SO U.S., 4 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5902638	A	19990511	US 1993-24034	19930301

AB The method comprises forming on the superalloy, by chem. vapor deposition at low temps., a Co or Ni aluminide bonding interlayer as the Co or Ni of the superalloy surface reacts with an aluminum compd., depositing under **tensile stress**, at 1-30 torr, on the bonding interlayer an Al2O3 layer using Al diacetoacetic ester chelate and pyrolyzing th material at 300-500.degree., and heat-treating the Al2O3 layer to induce cracking, which imparts spallation resistance. A thermal barrier layer may be deposited on the Al2O3 layer. This method is esp. suitable for protecting superalloy turbine blades.

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L49 ANSWER 4 OF 6 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:564267 HCAPLUS
DN 125:202805
TI Thermal crack initiation mechanisms on the surface of functionally graded ceramic thermal barrier coatings
AU Kokini, K.; Takeuchi, Y. R.; Choules, B. D.
CS Sch. Mechanical Eng., Purdue Univ., West Lafayette, IN, 47907-1288, USA
SO Ceram. Int. (1996), 22(5), 397-401
CODEN: CINNDH; ISSN: 0272-8842
DT Journal
LA English
AB The surface crack initiation mechanism in a multilayer zirconia/**metal coating** on a steel substrate was detd. to be **tensile stresses** which are generated by cooling after relaxation of the compressive stresses at high temp. This crack initiation criterion is utilized to study the architectural design of a functionally graded zirconia/CoCrAlY coating. A graded system which is relatively thick will have a resistance to thermal crack initiation similar to that of a thinner single layer coating. The nonlinear distribution of the coating architecture with the smallest amt. of zirconia results in the smallest surface stresses. However, these results show that a particular design can be selected with will satisfy the stress

requirements of a given application.

L49 ANSWER 5 OF 6 HCAPLUS COPYRIGHT 2002 ACS
AN 1996:471943 HCAPLUS
DN 125:314557
TI The oxide coating effects on the magnetic properties of amorphous alloys
AU Bae, Young Je; Jang, Ho G.; Chae, Hee K.
CS Dep. Chem., Hankuk Univ. Foreign Studies, Yongin, 449-791, S. Korea
SO Bull. Korean Chem. Soc. (1996), 17(7), 621-625
CODEN: BKCSDE; ISSN: 0253-2964
DT Journal
LA English
AB A variety of **metal** oxides were **coated** by sol-gel process from their metal alkoxides on the ribbons of Co-based and Fe-based amorphous alloys, and the effects of surface oxide coating on the magnetic properties of the alloy were studied. The core loss is reduced significantly by the oxide coating, the loss redn. becoming more prominent at higher frequencies. The shape of the hysteresis loop is also dependent upon the kind of the **coated metal** oxide. The coatings of MgO, SiO2, MgO.cntdot.SiO2 and MgO.cntdot.Al2O3 induce **tensile stress** into the Fe-based ribbon whereas those of BaO, Al2O3, CaO.cntdot.Al2O3, SrO.cntdot.Al2O3 and BaO.cntdot.Al2O3 induce compressive stress. These results may be explained by the modification of domain structures via magnetoelastic interactions with the shrinkage stress induced by the sol-gel coating.

L49 ANSWER 6 OF 6 HCAPLUS COPYRIGHT 2002 ACS
AN 1994:83306 HCAPLUS
DN 120:83306
TI Development and application of pulsed-air-arc deposition
AU Parkansky, N.; Boxman, R. L.; Goldsmith, S.
CS Electr. Discharge Plasma Lab., Tel Aviv Univ., Tel Aviv, 69978, Israel
SO Surf. Coat. Technol. (1993), 61(1-3), 268-73
CODEN: SCTEEJ; ISSN: 0257-8972
DT Journal
LA English
AB Pulsed-air-arc deposition (PAAD) is a process of depositing coatings using high current short-duration pulsed elec. arcs to melt and evap. material from a source anode and to transport it to the workpiece which is held in close proximity. The workpiece serves as the cathode, and the elec. discharge action at its surface removes surface contaminants so that an adhesive coating forms. The short distance between the source electrode and the workpiece, together with the high pressure of the plasma jet emitted from the source anode, excludes air from the vicinity of the deposition and minimizes oxidn. The max. coating thickness which can be applied, about 100 .mu.m, is limited by residual **tensile stress** (RTS), which ultimately causes surface damage and material loss. The RTS increases with increasing deposition time, until a max. is reached, after which surfaces damage and mass loss occur. Ductile and brittle materials exhibit different surface damage patterns. The max. coating thickness can be increased by a factor of 2 by periodically interrupting the deposition process and annealing. A compressive stress externally applied to the source electrode decreases the erosion rate, and conversely **tensile stresses** increase the erosion rate. An external **tensile stress** applied to the work piece decreases the max. coating thickness and conversely an externally applied compressive stress can increase the max. coating thickness by a factor of 2.

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     FILE 'WPIX, JAPIO' ENTERED AT 10:07:13 ON 02 JUL 2002
L1        173763 S (COAT#### OR FILM OR LAYER?)(2N)METAL
L2          4862 S (TIN OR SN)(W)(ALLOY)
L3         16253 S (NI OR NICKEL)(W)(ALLOY)
L4          6139 S (CO OR COBALT)(W)(ALLOY)
L5            56 S (TIN OR SN)(W)(WHISKER)
L6         12825 S MICROMETER
L7         28403 S MPA
L8         55334 S (FILM OR LAYER? OR COAT#### OR UNDERLAYER? OR TOPLAYER? OR UN
L9            10 S L5 AND (L2-4)
L10            4 S L5 AND L1
L11            3 S L10 NOT L9
L12           24 S L5 AND L8
L13           12 S L12 NOT (L9 OR L10)
L14           31 S L5 NOT (L9 OR L10 OR L12)
L15          475 S L1 AND L2
L16         1508 S L1 AND L3
L17          570 S L1 AND L4
L18            1 S L15 AND TENSILE STRESS
L19            2 S L16 AND TENSILE STRESS
L20            1 S L17 AND TENSILE STRESS
L21            3 S L15 AND L6
L22            3 S L16 AND L6
L23            0 S L17 AND L6
L24            3 S L15 AND L7
L25            4 S L16 AND L7
L26            1 S L17 AND L7
L27           18 S L18-26 NOT L5
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L9 ANSWER 1 OF 10 WPIX (C) 2002 THOMSON DERWENT
AN 2001-150830 [16] WPIX
DNN N2001-110913 DNC C2001-044828
TI Electrolytic capacitor has **tin alloy** layer including antimony, indium, bismuth or palladium formed on surface of external terminal.
DC L03 V01
PA (NIEM) NIPPON CHEMICON CORP
CYC 1
PI JP 2000277383 A 20001006 (200116)* 5p
ADT JP 2000277383 A JP 1999-86363 19990329
PRAI JP 1999-86363 19990329
AB JP2000277383 A UPAB: 20010323
NOVELTY - An aluminum rivet (11) penetrates sealing board which seals opening of outer cladding case of capacitor. External terminals (10) are connected to the rivet by welding. A **tin alloy** layer (20) which is made of metal chosen out of antimony, indium, bismuth or palladium, is formed on the surface of external terminal.
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for electrolytic capacitor manufacture.
USE - Electrolytic capacitor.
ADVANTAGE - As the **tin alloy** layer is formed on the surface of external terminal, occurrence of **tin whisker** from welding portion is prevented and leakage current is reduced. Electrolytic capacitor of outstanding short circuit prevention characteristic and high reliability is obtained.
DESCRIPTION OF DRAWING(S) - The figure shows the principal expanded sectional view of the welding portion of terminal and rivet in electrolytic capacitor.
External terminal 10
Aluminum rivet 11
Tin alloy layer 20
Dwg.1/3

L9 ANSWER 2 OF 10 WPIX (C) 2002 THOMSON DERWENT
AN 1989-372157 [51] WPIX
DNN N1989-283288 DNC C1989-164774
TI Whisker-free tin or (alloy) plated article - includes a plated indium underlayer.
DC L03 M11 M13 U11 V04
IN SHIMAUCHI, H; SUZUKI, K
PA (NIHA) NIPPON MINING CO
CYC 6
PI EP 346888 A 19891220 (198951)* EN 10p
R: DE FR GB
JP 01316951 A 19891221 (199006)
JP 02004978 A 19900109 (199007)
JP 02004984 A 19900109 (199007)
US 4959278 A 19900925 (199041)
KR 9200592 B1 19920116 (199340)
EP 346888 B1 19940316 (199411) EN 11p
R: DE FR GB
DE 68913818 E 19940421 (199417)
ADT EP 346888 A EP 1989-110828 19890614; JP 01316951 A JP 1988-146772 19880616; JP 02004978 A JP 1988-146894 19880616; JP 02004984 A JP 1988-146895 19880616; US 4959278 A US 1989-363615 19890608; KR 9200592 B1 KR 1989-8190 19890614; EP 346888 B1 EP 1989-110828 19890614; DE 68913818 E DE 1989-613818 19890614, EP 1989-110828 19890614

FDT DE 68913818 E Based on EP 346888
PRAI JP 1988-146772 19880616; JP 1988-146894 19880616; JP 1988-146895 19880616
AB EP 346888 A UPAB: 19930923
Sn (**alloy**) plated article includes an In plated layer between the substrate and the **Sn** (**alloy**) layer. The substrate is formed of Fe (alloy) or Cu (alloy) or may be a film carrier for mounting semiconductor components etc. The In plated layer pref. has a thickness of not less than 0.01 micron pref. not less than 0.05 micron.
Specifically **Sn** (**alloy**) plated layer thickness is 0.1-1.0 micron esp. 0.5-0.7 micron. Process is claimed, the plating method being electro or electroless. In an embodiment, In plating is carried out using an acidic electroless bath contg. (in g/l.):In salt 1-50 esp. 10-20 and a thiourea (deriv.) 50-200 esp. 60-100, at a pH of 3 or less esp. 1 or less. The plating bath is claimed. After **Sn** (**alloy**) plating, the structure is heat treated at 50-150 deg.C.
USE/ADVANTAGE - With ornaments, electrical and electronic components, structural components etc. Generation of **Sn whiskers** is prevented (claimed).
1/1

L9 ANSWER 3 OF 10 WPIX (C) 2002 THOMSON DERWENT
AN 1986-084506 [13] WPIX
DNC C1986-035945
TI Tin-plated material mfr. avoiding whisker generation - using copper nickel, copper tin-nickel, and zinc-nickel or copper-zinc-**nickel alloy** substrates.
DC M13 M26
PA (MITQ) MITSUBISHI DENKI KK
CYC 1
PI JP 61030656 A 19860212 (198613)* 3p
ADT JP 61030656 A JP 1984-152286 19840723
PRAI JP 1984-152286 19840723
AB JP 61030656 A UPAB: 19930922
Tin plating is effected on (A) Cu-**Ni alloy** contg. 19-100% Ni; (B) Cu-Sn-**Ni alloy** contg. 21-95.5% Ni, 4.5 - 5.7% Sn; and (C) Zn-Ni or Cu-Zn-**Ni alloy** contg. 5-91% Ni and 9-13% Zn.
USE/ADVANTAGE - Whisker generation on the Sn-plating is avoided.
In an example Sn plated Cu-alloy was kept for 2 years. Whisker generation quickly decreased at increasing Ni-content from 10 to 19% and no whisker was observed above 19% **Sn**. **Whisker** generation dropped with increasing Ni content in Cu-2% Sn-**Ni alloy**. Whisker generation reduced at 0.2% Ni and no whisker was generated on commercially available 9% **Ni alloy**. Similarly, no whisker generated on Sn-plated 84% Cu-11% An-5% **Ni alloy** nor on Sn-plated 74% Cu-5% Sn-21% **Ni alloy**
.
0/2

L9 ANSWER 4 OF 10 WPIX (C) 2002 THOMSON DERWENT
AN 1984-079302 [13] WPIX
DNC C1984-034151
TI Coating tin plate with thin layer of lead - to prevent formation of **tin whiskers**.
DC L03 M11 M13
PA (MITQ) MITSUBISHI ELECTRIC CORP
CYC 1
PI JP 59031886 A 19840221 (198413)* 3p

ADT JP 59031886 A JP 1982-141493 19820812
PRAI JP 1982-141493 19820812
AB JP 59031886 A UPAB: 19930925
After substrate metal is coated with tin in a conventional manner, a thin lead film of thickness above 0.05 microns is formed on the surface. The lead film is formed by electroplating, electroless plating, vapour deposition, spattering, ion implantation, etc. and may be a Pb-**Sn alloy** contg. at least 5% Pb.
The effect of the lead film is enhanced by the diffusion of lead into the tin layer.
0/3

L9 ANSWER 5 OF 10 WPIX (C) 2002 THOMSON DERWENT
AN 1976-76609X [41] WPIX
TI Tin-**nickel alloy** surface coated articles - having wear resistance, with **tin whisker** growth prevented and are readily soldered.
DC L03 M13
PA (ALPS) ALPS ELECTRIC CO LTD
CYC 1
PI JP 51096739 A 19760825 (197641)*
JP 56032392 B 19810727 (198134)
PRAI JP 1975-21615 19750221
AB JP 51096739 A UPAB: 19930901
Article having tin-**nickel alloy** surface layer is produced when a material having a tin surface is immersed in an aq. soln. of a Ni salt including librated chlorine ion to make the tin chemically alloyed with the nickel. The immersion bath is most pref. of hydrochloric acid with pH <1, and total amt. of the nickel salt being 200-500g/l. Temp. of the bath is 20-70 degrees C. Immersion time is form several seconds to ca. 10 mins. In soldering such article the surface of the article si broken as a result of the tin melting underneath. The deterioration of soldering performance is reduced and the wear resistance of the tin surface is remarkably increased. Growth of "**tin whisker**" is reduced. USed in communication machines and appts. and the whole electrical industrial field.

L9 ANSWER 6 OF 10 JAPIO COPYRIGHT 2002 JPO
AN 2000-277383 JAPIO
TI ELECTROLYTIC CAPACITOR AND ITS MANUFACTURE
IN NAKAAKI KENTARO; TSUJI TATSUNORI
PA NIPPON CHEMICON CORP
PI JP 2000277383 A 20001006 Heisei
AI JP1999-086363 (JP11086363 Heisei) 19990329
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
AB PROBLEM TO BE SOLVED: To prevent the occurrence of **tin whiskers** by a method, wherein a tin apply layer containing a predetermined amount of one metal selected from antimony, indium, bismuth, and palladium is formed on the surface of an external terminal. SOLUTION: In this electrolytic capacitor, a layer (**tin alloy** layer) 20 composed of tin containing a prescribed metal is formed on the surface of an external terminal 10, and this external terminal is welded to an aluminum rivet 11, and a metal is included in a welding part 12, whereby the occurrence of **tin whiskers** is restrained. As a metal included in tin, any one of antimony, indium, bismuth, and palladium will do. Furthermore, a composition of the **tin alloy** layer 20 containing these metals was explored, and as the results, it is decided that the content of these metals is in the range of 0.5 to 10.0 wt.%. Thus, the electrolytic capacitor in which a

leakage current is low, and there is not possibility that a short-circuit occurs is superior in characteristics and reliability, and can be manufactured only by changing a plating material of the external terminal.

L9 ANSWER 7 OF 10 JAPIO COPYRIGHT 2002 JPO
AN 1990-004984 JAPIO
TI PRODUCTION OF TIN OR **TIN ALLOY** PLATED BODY WHILE PREVENTING GENERATION OF **TIN WHISKER**
IN SHIMAUCHI HIDENORI; SUZUKI KEIJIRO
PA NIPPON MINING CO LTD, JP (CO 330259)
PI JP 02004984 A 19900109 Heisei
AI JP1988-146895 (JP63146895 Heisei) 19880616
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 700, Vol. 14, No. 131, P. 101 (19900313)
AB PURPOSE: To prevent the generation of **Sn whiskers** during Sn or **Sn alloy** plating with a simple operation by subjecting a body to be plated to In plating before Sn or **Sn alloy** plating.
CONSTITUTION: An In plating layer of about .gtoreq.0.01.mu.m, preferably .gtoreq.0.05.mu.m thickness is formed on a body to be plated by electroplating or electroless plating. An Sn or **Sn alloy** plating layer of about 0.1-1.0.mu.m, preferably 0.5-0.7.mu.m thickness is then formed on the In underlayer by electroplating or electroless plating. The generation of **Sn whiskers** during the Sn or **Sn alloy** plating can be prevented and a short circuit and other accidents due to **Sn whiskers** can be avoided. When the resulting Sn or **Sn alloy** plated product is used, electric parts, etc., having high reliability can be provided.

L9 ANSWER 8 OF 10 JAPIO COPYRIGHT 2002 JPO
AN 1986-266597 JAPIO
TI FILM TREATMENT OF COPPER ALLOY ROD FOR CONTACTOR
IN NOGUCHI HIROYUKI; OGAWA YOSHIAKI
PA MITSUBISHI ELECTRIC CORP, JP (CO 000601)
PI JP 61266597 A 19861126 Showa
AI JP1985-109831 (JP60109831 Showa) 19850522
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 417, Vol. 11, No. 132, P. 106 (19870424)
AB PURPOSE: To form a film which is free from **tin whiskers**, etc., by electroplating tin to a pretreated copper alloy rod, heating and melting the same to coat the desired part of the surface and removing the reflow tin in the non-coated part then stripping the coating material.
CONSTITUTION: The surface of the copper alloy strip is subjected to the pretreatment including degreasing, pickling, etc. and is thereby activated. The copper underlying layer is then electroplated on the surface to .ltoreq.1.mu. film thickness. The tin or **tin alloy** layer is electroplated on such copper underlying layer to 0.7-1.5.mu. film thickness. The alloy rod is then heated to the m.p. of the tin-lead alloy or above to decompose and evaporate the remaining org. additive and to melt the tin or thin alloy. The rod is then cooled to solidify the melt and to form the reflow tin or **tin alloy** layer, by which the adhesiveness to the copper alloy rod is improved. The desired part of the reflow tin or **tin alloy** layer is coated with the coating material and after the unnecessary part of the reflow tin or thin alloy is removed by a solvent, the coating material is stripped. The reflow tin or **tin alloy** is thus formed to the desired position.

L9 ANSWER 9 OF 10 JAPIO COPYRIGHT 2002 JPO
AN 1984-035694 JAPIO
TI METHOD FOR PREVENTING FORMATION OF **TIN WHISKER**
IN KAWANAKA RYUSUKE; NANGO SHIGEYUKI; TAKEUCHI MORIHISA; HASEGAWA TOMOHARU
PA MITSUBISHI ELECTRIC CORP, JP (CO 000601)
PI JP 59035694 A 19840227 Showa
AI JP1982-147480 (JP57147480 Showa) 19820823
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 227, Vol. 8, No. 1221, P. 109 (19840608)
AB PURPOSE: To prevent simply the formation of **tin whiskers** at a low cost without depriving tin plating of its effect, by forming a thin lead film on the surface of the tin plating formed on a base metal. CONSTITUTION: A tin film 11 is formed on a base metal 13 by plating after forming an under film 12 on the metal 13 by plating, and a thin lead film 31 is formed on the film 11. Thus, the formation of **tin whiskers** can be prevented without deteriorating the advantages of the tin plating such as improved rust and corrosion preventing properties and solderability. The lead film 31 is formed by electroless plating, vapor deposition, sputtering or other method. A region having high lead concn. may be formed in place of the lead film 31 by ion implantation, diffusion or other method, or a thin film of a lead-**tin alloy** contg. .gtoreq.5% lead may be formed and the same effect is obtd.

L9 ANSWER 10 OF 10 JAPIO COPYRIGHT 2002 JPO
AN 1979-129976 JAPIO
TI IC LEAD FRAME
IN FURUYAMA TOMOYUKI
PA NIPPON GAKKI SEIZO KK, JP (CO 000407)
PI JP 54129976 A 19791008 Showa
AI JP1978-37717 (JP53037717 Showa) 19780331
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 158, Vol. 3, No. 15, P. 37 (19791211)
AB PURPOSE: To obtain resistance to a high temperature, to maintain excellent solderability, and to prevent the breakdown of a chip, by providing an Ag layer onto the Sn-**Ni alloy** layer at an edge part inside of a lead where the fixing part of the IC chip is connected to the chip.
CONSTITUTION: After thermal oxidation, Sn-**Ni alloy** maintains excellent solderability and also suppresses whisker growth of Sn. For the purpose, a Sn-**Ni alloy** layer is provided onto the entire metal substrate first and an Ag plating layer is provided partially onto it. As a result, a grown **Sn whisker** will never penetrate the Ag layer to break the chip of a Si thin plate of insufficient elasticity like a pure-Sn plating layer, so that a lead frame of good quality can be obtained.

L11 ANSWER 1 OF 3 WPIX (C) 2002 THOMSON DERWENT
AN 2001-033969 [05] WPIX
DNN N2001-026623 DNC C2001-010457
TI Tin plating of metal parts of semiconductor devices involves applying tin layer, heating by laser radiation and cooling in same apparatus.
DC L03 U11
IN CREMA, P
PA (SGSA) STMICROELECTRONICS SRL
CYC 25
PI EP 1061575 A1 20001220 (200105)* EN 6p
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
ADT EP 1061575 A1 EP 1999-830368 19990615
PRAI EP 1999-830368 19990615
AB EP 1061575 A UPAB: 20010124
NOVELTY - After applying a tin **layer** to the **metal** parts heating is carried out by laser radiation to a temperature such that at least one predetermined region of the tin layer is melted, followed by cooling to a temperature such that the melted tin is solidified.
DETAILED DESCRIPTION - The tin layer is applied to the metal parts in an electrolytic bath, followed by washing.
Laser radiation is emitted by an Nd:YAG CW laser with wavelength of 1064 nm in trains of pulses at a frequency of 5-30 kHz.
The stages of application of the tin layer, washing, heating and cooling are carried out in succession in the same apparatus.
USE - Plating, especially tin-plating, of metal parts of semiconductor devices.
ADVANTAGE - Formation of **tin** '**whiskers**' leading to short circuiting between adjacent metal strips is eliminated. Selective melting of the tin layer is achieved. Process is simpler than the prior art since a fluxing stage is not required and the whole process can be carried out in the same apparatus.
Dwg.0/0

L11 ANSWER 2 OF 3 WPIX (C) 2002 THOMSON DERWENT
AN 1987-208591 [30] WPIX
DNC C1987-087383
TI Avoiding growing **tin whisker** on substrate - comprises addn. of high conc. metal salt to initial coating soln., to prepare satd. soln. and applying to substrate.
DC L03 M13
PA (OLIN) OLIN CORP
CYC 2
PI JP 62077481 A 19870409 (198730)* 9p
US 4749626 A 19880607 (198825) 6p
ADT JP 62077481 A JP 1986-182875 19860805; US 4749626 A US 1986-879118 19860703
PRAI US 1985-762177 19850805; US 1986-879118 19860703
AB JP 62077481 A UPAB: 19930922
Avoiding growing whisker comprises adding metal salt of higher concn. than saturation point of the soln., to an initial coating soln. contg. Sn, to prepare a metal salt-satd. soln., and applying this soln. to the substrate. The salt is e.g. a Ag salt.
USE - For electric appts. (Provisional Basic previously advised in week 8720).
0/0

L11 ANSWER 3 OF 3 WPIX (C) 2002 THOMSON DERWENT

AN 1977-31642Y [18] WPIX
TI Treating electronic components to prevent **tin whiskers** formation - by diffusing copper, silver, gold or cadmium into tin layer.
DC M14
PA (NIDE) NIPPON ELECTRIC CO
CYC 1
PI JP 52036529 A 19770319 (197718)*
JP 58021036 B 19830426 (198320)
PRAI JP 1975-113447 19750918
AB JP 52036529 A UPAB: 19930901
The surface of a metal workpiece is formed with tin layer to which is applied >=1 layer of copper, silver, gold and cadmium. The **metal layer** is diffused into the tin layer, to form a surface layer of higher tin content.

This is applied to surface treatment of outside lead plated with tin to a thickness of several thousand angstroms to several mu in electronic parts to prevent formation of **tin whiskers** without deteriorating weather resistance of the plating film.

A copper plate is plated with tin 2 mu thick, further plated with copper 0.5 mu thick, and then retained in nitrogen atmos. at about 180 degrees C for 30 min.

L13 ANSWER 1 OF 12 WPIX (C) 2002 THOMSON DERWENT
AN 2002-215606 [27] WPIX
DNN N2002-165161 DNC C2002-065824
TI Copper foil for tape automated bonding tape carrier has alloy layer formed on shiny surface of foil.
DC L03 P73 U11
IN ENDO, A; NODA, K
PA (NIEL-N) NIPPON ELECTROLYZING CO LTD; (NIDE-N) NIPPON DENKAI KK; (NIDE-N) NIPPON DENKAI LTD; (ENDO-I) ENDO A; (NODA-I) NODA K
CYC 4
PI US 2001049027 A1 20011206 (200227)* 7p
CN 1325790 A 20011212 (200227)
JP 2002016111 A 20020118 (200227) 8p
KR 2001098846 A 20011108 (200227)
ADT US 2001049027 A1 US 2001-829045 20010410; CN 1325790 A CN 2001-117194 20010425; JP 2002016111 A JP 2001-125838 20010424; KR 2001098846 A KR 2001-22124 20010424
PRAI JP 2000-124636 20000425
AB US2001049027 A UPAB: 20020429
NOVELTY - A copper foil consists of a foil having shiny and mat surfaces, and an alloy layer formed on the shiny surface. The alloy **layer** comprises **nickel**, **cobalt** and molybdenum.
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a tape automated bonding carrier tape comprising a flexible insulating film and the copper foil.
USE - Tape automated bonding (TAB) tape carrier.
ADVANTAGE - The copper foil effectively prevents both the generation of **tin whiskers** and Kirkendall voids without requiring any addition or change of steps after copper lead pattern formation. The copper foil has good heat resistance and solder wettability.
Dwg.0/0

L13 ANSWER 2 OF 12 WPIX (C) 2002 THOMSON DERWENT
AN 2000-152780 [14] WPIX
DNN N2000-113764
TI Lead wire structure of electrolytic capacitor for connecting with cathode and anode electrode foils - has bismuth **tin layer** formed on leader of lead wires and leader is welded to round bar portion by fusing bismuth.
DC V01
PA (NIEM) NIPPON CHEMICON CORP
CYC 1
PI JP 2000012386 A 20000114 (200014)* 6p
ADT JP 2000012386 A JP 1998-177783 19980624
PRAI JP 1998-177783 19980624
AB JP2000012386 A UPAB: 20000320
NOVELTY - Leader (8) of lead wires (4,5) is tin plated and bismuth layer (10) is coated. Leader is welded to round bar portion (6) by melting bismuth on welding portion (9). Flat portion of tab terminal respectively joins lead wires to anode electrode foil and cathode electrode foil wound via separator (11). DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for the manufacturing method of lead wire.
USE - Used in the manufacture of electrolytic capacitor. For connecting with cathode and anode foils.
ADVANTAGE - Generation of **tin whisker** from lead wire portion is prevented since bismuth **tin layer** formed on leader of lead wires and round bar portion of tab terminal is made to contain fused bismuth by welding. Leakage current is low and there

is no short circuit generation. DESCRIPTION OF DRAWING(S) - The figure shows a sectional view of electrolytic capacitor. (4,5) Lead wires; (6) Round bar portion; (8) Leader; (9) Welding portion; (10) Bismuth layer; (11) Separator.
Dwg.1/3

L13 ANSWER 3 OF 12 WPIX (C) 2002 THOMSON DERWENT
AN 1997-402838 [37] WPIX
DNN N1997-335008
TI Contact bump structure formed onto aluminium contact pad area - includes tin bump formed by means of auto-catalytic reaction on contact pad area and lead layer for preventing formation of **tin whiskers** is formed onto bump surface.
DC U11
IN AINTILA, A
PA (PICO-N) PICOPAK OY
CYC 18
PI WO 9728562 A1 19970807 (199737)* EN 15p
RW: AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE
W: DE GB US
FI 9600502 A 19970803 (199745)
EP 878023 A1 19981118 (199850) EN
R: DE FI FR NL
ADT WO 9728562 A1 WO 1997-FI47 19970130; FI 9600502 A FI 1996-502 19960202; EP 878023 A1 EP 1997-901650 19970130, WO 1997-FI47 19970130
FDT EP 878023 A1 Based on WO 9728562
PRAI FI 1996-502 19960202
AB WO 9728562 A UPAB: 19970915
The contact bump structure includes an aluminium contact pad area (3) on a silicon substrate (1) with a tin bump (8) formed by an auto-catalytic reaction onto the contact pad area. A lead layer (9) for preventing the formation of **tin whiskers** is formed onto the surface of the tin bump.
At least one **nickel layer** (4,5) is formed onto the surface of the aluminium contact pad area by an auto-catalytic reaction. A copper layer (6) is deposited between the **tin layer** and the **nickel layer** for the purpose of improved tin adherence.
ADVANTAGE - Metallurgical structure is attained which during soldering process and under operating condition does not form brittle inter-metal compounds or such uncontrolled intermetallic alloying that is detrimental to solder bond.
Dwg.1/6

L13 ANSWER 4 OF 12 WPIX (C) 2002 THOMSON DERWENT
AN 1993-058579 [07] WPIX
DNN N1993-044669 DNC C1993-026149
TI Inhibition of **tin whisker** growth used in e.g. coating electronic circuits - comprises implanting e.g. antimony ion into surface of **tin coating** on component.
DC L03 M13 P42 U11 V04
IN MACKAY, C A
PA (MICR-N) MICROELECTRONICS & COMPUTER TECHN
CYC 16
PI WO 9301895 A1 19930204 (199307)* EN 15p
RW: AT BE CH DE DK ES FR GB GR IT LU MC NL SE
W: JP US
JP 06501523 W 19940217 (199412) 4p
US 5393573 A 19950228 (199514) 4p

ADT WO 9301895 A1 WO 1992-US5943 19920716; JP 06501523 W WO 1992-US5943 19920716, JP 1993-502945 19920716; US 5393573 A US 1991-730744 19910716
FDT JP 06501523 W Based on WO 9301895
PRAI US 1991-730744 19910716
AB WO 9301895 A UPAB: 19930924
Prevention of development and growth of **tin whiskers** comprises (a) providing an electrical component having a **tin coating**. (b) inhibiting whisker growth on the **tin coatng** by implanting into the surface of the **tin coating** an ion selected from Pb, Bi, Sb, Tl, Cu, Ag, Au, Cd, Mo, Cr, W, Ar, He, Ne and Kr.

Also claimed is a process as above where the ion is selected from about 1x10power14-1x10power16 ions/cm2 of an antimony ion, about 1x10power14-1x10power16 ions/cm2 of an organ ion or at least 1x10power13 ions/cm2 of molybdenum ion.

USE/ADVANTAGE - Used in coating electronic circuits, electronic devices, and electrical connectors. A surface metal alloy having reduced diffusion characteristics inhibit the mechanisms promoting **tin whisker** growth is produced.
0/0

L13 ANSWER 5 OF 12 WPIX (C) 2002 THOMSON DERWENT
AN 1984-085641 [14] WPIX
DNC C1984-036553
TI Inhibiting **tin whisker** formation on tin plating - by applying thin layer of lead or its alloy to tin plate.
DC M11
PA (MITQ) MITSUBISHI ELECTRIC CORP
CYC 1
PI JP 59035694 A 19840227 (198414)* 3p
ADT JP 59035694 A JP 1982-147486 19820823
PRAI JP 1982-147480 19820823; JP 1982-147486 19820823
AB JP 59035694 A UPAB: 19930925
Method comprises applying a thin Pb or Pb alloy layer of thickness at least 0.05 microns the **Sn** plating **layer** surface. The Pb or Pb alloy layer is produced by electroplating, electroless plating, ion plating, diffusion, vapour deposition or sputtering etc. The **Sn** plating **layer** may be heat treated after application of the Pb or Pb alloy layer.

Method is suitable for surface finishing parts of electrical or electronic devices, etc.
0/3

L13 ANSWER 6 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 2002-016111 JAPIO
TI COPPER FOIL USED FOR TAB TAPE CARRIER, AND TAB CARRIER TAPE AND TAB TAPE CARRIER USING COPPER FOIL
IN ENDO AYUMI; NODA KOJIRO
PA NIPPON DENKAI·KK
PI JP 2002016111 A 20020118 Heisei
AI JP2001-125838 (JP2001125838 Heisei) 20010424
PRAI JP 2000-4636 20000425
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2002
AB PROBLEM TO BE SOLVED: To provide copper foil used for a TAB tape carrier having highly reliable suppression effect of **Sn whiskers** and Kirkendall voids without the need of the increase and the change of a process after a copper lead pattern is generated, and to provide a TAB carrier tape and the TAB tape carrier which use copper foils.
SOLUTION: Copper foils used for the TAB tape carrier having an alloy

layer constituted of **nickel**, cobalt and molybdenum on at least the glossy face side of copper foil, and the TAB carrier tape and the TAB tape carrier which use copper foil, are installed.

L13 ANSWER 7 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 2000-012386 JAPIO
TI ELECTROLYTIC CAPACITOR AND MANUFACTURE OF THE SAME
IN SHIBATA YUZO; TSUJI TATSUNORI; SASAKI TOSHIAKI; NAKAAKI KENTARO
PA NIPPON CHEMICON CORP
PI JP 2000012386 A 20000114 Heisei
AI JP1998-177783 (JP10177783 Heisei) 19980624
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2000
AB PROBLEM TO BE SOLVED: To prevent the generation of **tin whisker** from a lead line part, and to prevent the increase of leakage currents or the occurrence of short circuit.
SOLUTION: Tin plating containing bismuth which is 0.5-10.0 wt.% is operated to the surface of a lead line 8 constituted of a CP line so that a bismuth **tin layer** 10 can be formed. Afterwards, this leading line 8 is welded to a round bar part 6 of a tab terminal constituted of the round bar part 6 and a flat part 7 so that lead lines 4 and 5 can be formed. When welded, the bismuth **tin layer** 10 is melted so that bismuth can be contained in a welding part 9. The flat parts 7 of the lead lines 4 and 5 are respectively connected with an anode electrode foil 2 and a cathode electrode foil 3, and those electrode foils 2 and 3 are wound through a separator 11 so that a capacitor element 1 can be prepared. Electrolytic solution is immersed in the capacitor element 1, and the lead lines 4 and 5 are inserted into the hole part of a sealing body 12, and the capacitor element 1 is housed in a cylindrical armor case 13 having a bottom. Then, the end part of the opening of the armor case 13 is sealed and this electrolytic capacitor is completed.

L13 ANSWER 8 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 1993-033187 JAPIO
TI METHOD FOR CONTROLLING WHISKER IN TINNING
IN KURIHARA HIROAKI
PA MITSUI MINING & SMELTING CO LTD, JP (CO 000618)
PI JP 05033187 A 19930209 Heisei
AI JP1991-207236 (JP03207236 Heisei) 19910725
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 1074, Vol. 17, No. 333, P. 39 (19930624)
AB PURPOSE: To control **tin whiskers** by a relatively low-cost means without introducing a metal other than tin as a plating film by preplating or alloy plating and to obtain a pure **tin film** having high reliability by tinning on a fine pattern.
CONSTITUTION: When a fine Cu or Cu alloy pattern is tinned, it is first tinned in .gtoreq.0.15.mu.m thickness and all the resulting pure **tin layer** on the Cu base is converted into a Cu-**Sn** diffusion **layer** by heating. This diffusion layer is further tinned to form a pure **tin layer** of 0.15-0.8.mu.m thickness.

L13 ANSWER 9 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 1992-263444 JAPIO
TI THREE-LAYERED TAB USING ROLLED COPPER FOIL
IN GEN KENI; OMA MASAHIRO
PA SUMITOMO METAL MINING CO LTD, JP (CO 329023)
PI JP 04263444 A 19920918 Heisei

AI JP1991-45735 (JP03045735 Heisei) 19910218
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1314, Vol. 17, No. 5, P. 22 (19930129)
AB PURPOSE: To provide the title three **layered** TAB having **tin layer** on the surface hardly producing **tin whisker** and having a long latent period until the whisker is produced.
CONSTITUTION: The title three layered TAB is composed of a polyimide film, a bonding agent layer coated on the polyimide film, a rolled copper foil bonded onto the polyimide film using the bonding agent layer and tip layer covering the surface of the rolled copper foil.

L13 ANSWER 10 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 1992-263063 JAPIO
TI COPPER OR COPPER ALLOY **LAYER** HAVING **TIN COATING LAYER** ON SURFACE
IN GEN KENI
PA SUMITOMO METAL MINING CO LTD, JP (CO 329023)
PI JP 04263063 A 19920918 Heisei
AI JP1991-45733 (JP03045733 Heisei) 19910218
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 1022, Vol. 17, No. 52, P. 47 (19930202)
AB PURPOSE: To prevent the development of **tin whisker** by arranging a layer of material in which copper except a **nickel** copper **layer** is difficult to diffuse, and **tin** costing **layer** applied on the surface of copper layer.
CONSTITUTION: A copper layer or a copper alloy layer is formed as film on a substrate (aluminum, etc,) with vapor-deposit method, etc., and on the surface of this film, a layer of material (e.g. thallium, etc.) in which copper excluding nickel is difficult to diffuse, is formed as the film at .gtoreq. about 100.ANG. thickness with a sputtering method, etc. Further, on the surface of this **film**, a **tin film** is formed with the vapor-deposit method, etc. By this method, diffusion of copper into the **tin layer** side is prevented and the development of **tin whisker** is prevented, or period until the devepment of whisker can be prolonged. This method is available to terminal of lead, switch or relay in IC.

L13 ANSWER 11 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 1984-031886 JAPIO
TI METHOD FOR PREVENTING FORMATION OF **TIN WHISKER**
IN KAWANAKA RYUSUKE; NANGO SHIGEYUKI; TAKEUCHI MORIHISA; HASEGAWA TOMOHARU
PA MITSUBISHI ELECTRIC CORP, JP (CO 000601)
PI JP 59031886 A 19840221 Showa
AI JP1982-141493 (JP57141493 Showa) 19820812
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 226, Vol. 8, No. 1181, P. 140 (19840531)
AB PURPOSE: To prevent effectively the formation of **tin whiskers** without losing the effect of tin plating, by subjecting a substrate metal to conventional tin plating and by forming a very thin lead layer on the plated metal.
CONSTITUTION: A striking **tin film** 12 is formed on a substrate metal 13 such as brass by plating with a tin plating soln. A **tin film** 11 is formed on the film 12 by conventional tin plating, and a thin lead film 31 of .gtoreq.0.05.mu.m thickness is formed on the film 11. Since the tin plating and the thin lead film are separately prepared, the advantages of the tin plating are reserved, and the plating soln. requires simpler control than a plating soln. for solder plating. An expensive plating soln. such as a solder plating soln. is not

used in this method, so this method is very effective as a method for preventing the formation of **tin whiskers**.

L13 ANSWER 12 OF 12 JAPIO COPYRIGHT 2002 JPO
AN 1981-032748 JAPIO
TI IC WITH BUMP AND MANUFACTURE THEREOF
IN OGAWA KENICHI
PA SEIKO INSTR & ELECTRONICS LTD, JP (CO 000232)
PI JP 56032748 A 19810402 Showa
AI JP1979-107975 (JP54107975 Showa) 19790824
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 60, Vol. 5, No. 861, P. 50 (19810605)
AB PURPOSE: To simplify the steps of treating a substrate on which an IC with a bump is carried by employing a bump **coated** with a **tin coating** by an electroless plating process on the copper bump as a bump when bonding the IC on the substrate, thereby eliminating shortcircuit or the like thereat.
CONSTITUTION: An aluminum wiring layer 1 is formed on the substrate, and is surrounded by an insulating protective film 2, and a barrier metallic film 3 of Cr of the like is coated from the surface of the layer 1 over the end of the film 2. Then, a plating metallic film 4 is laminated thereon, the thick copper bump 5 is precipitated thereon by plating, and the exposed surface of the bump 5 is electrolessly plated while coating other portion with positive type photoresist to thus form the **tin coating** 6 thereon. In this manner, there can be used a substrate plated by Au as the substrate, the wire may not be shortcircuited due to **tin whisker** when using a tin- plated substrate, the treatment thereafter may also be eliminated, and the reliability of the IC may be consequently improved.

L14 ANSWER 1 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 2001-556513 [62] WPIX
DNN N2001-413491 DNC C2001-165421
TI Nonconductive breachable metal material for internal computer components, has zinc-plated or tin-plated sheet steel substrate, and insulating organic polymer coating on substrate surface(s) and having specified thickness.
DC A32 A85 G02 L03 M13 P73
IN ADAMS, J A; MCLEAN, J R
PA (IBMC) INT BUSINESS MACHINES CORP
CYC 1
PI US 6248455 B1 20010619 (200162)* 10p
ADT US 6248455 B1 US 1998-219569 19981222
PRAI US 1998-219569 19981222
AB US 6248455 B UPAB: 20011026
NOVELTY - A nonconductive breachable metal material includes a zinc-plated or tin-plated sheet steel substrate, and an electrically insulating organic polymer coating on surface(s) of the substrate. The polymer coating is 0.5-0.8 mu m thick after curing at 200-210 deg. C for 10-15 minutes.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method of making the metal material.

USE - The invented metal material is used in internal computer components (claimed). It is particularly useful in housings for the hard drive and floppy drive units of a computer, support surfaces for computer chip boards, power supply unit housing, backing plates for external plug-in connections, and other chassis uses.

ADVANTAGE - The invention is rigid, non-corroding, and economical. The thickness of the polymer coating combines the benefits of making an electrically non-conductive surface and an easily penetrable surface for forming electrical contacts. The plating also offers reduced **tin whisker** growth, while giving a rough surface for the polymer for maximal specific adhesion. The curing process also enhances the reduced **tin whisker** growth properties of the coated substrate.
The invention improves the usefulness and longevity of computers and other devices.
Dwg.0/4

L14 ANSWER 2 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1994-022768 [03] WPIX
DNC C1994-010381
TI Prepn. of titanium nitride whiskers for reinforcing ceramic composites - comprises admixing titanium di oxide and/or alkali, titanate salt carbon powder and e.g. iron chloride and heating in nitrogen ..
DC L02
PA (TOJW) TOKAI CARBON KK
CYC 1
PI JP 05330999 A 19931214 (199403)* 4p
ADT JP 05330999 A JP 1992-161963 19920528
PRAI JP 1992-161963 19920528
AB JP 05330999 A UPAB: 19940303
To 100 pts. wt. Ti source material comprising Ti02 and/or an alkali titanate salt, are admixed 50-200 pts. wt. C powder and 1-30 pts. wt. catalytic chloride of Fe, Ni or Co. The homogeneous mixt. is then heated in a gaseous environment contg. N2, so that **TiN whiskers** ar produced. Pref. 10-100 pts. wt. alkali chloride is admixed to suppress prodn. of TiC powder.

ADVANTAGE - High-quality **TiN whiskers** may be produced efficiently from cheap, safe and solid raw materials. The whiskers are useful for reinforcement in ceramic composites.

In an example, anatase Ti02 (100 pts. wt) C black (50 pts. wt) and NiCl2 (10 pts. wt.) were blended mechanically and the mixt. was spread over a graphite plate, which was then set in a cylindrical container. A lid having small holes on the side was applied and the container was set in a high-frequency furnace. Under N2 gas blanketing, it was maintained at 1,300 deg.C for two hours.

Dwg.0/0

L14 ANSWER 3 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1993-267895 [34] WPIX
DNN N1993-205719
TI Tape carrier for TAB - applies nickel plating, thin copper plating, and tin plating by turns on patterned copper alloy lead and suppresses generation of **tin whiskers** NoAbstract.
DC U11
PA (HITD) HITACHI CABLE LTD
CYC 1
PI JP 05183017 A 19930723 (199334)* 4p
ADT JP 05183017 A JP 1991-357933 19911226
PRAI JP 1991-357933 19911226

L14 ANSWER 4 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1992-258941 [31] WPIX
CR 1994-025287 [03]
DNN N1992-197550 DNC C1992-115421
TI Conductive pad pattern for semiconductor devices - avoids **tin whisker** formation and removes excess material from passive side of device.
DC L03 U11
IN DION, J B
PA (DIGI) DIGITAL EQUIP CORP
CYC 1
PI US 5130275 A 19920714 (199231)* 17p
ADT US 5130275 A US 1990-547652 19900702
PRAI US 1990-547652 19900702
AB US 5130275 A UPAB: 19940322

A method of forming an electrically conductive pad pattern on a semiconductor device having active (22A) and passive (22B) sides, which removes excess substrate from the passive side and deters the formation of **tin whiskers**, comprises making many bumps (34) on the active side and patterning a mask (38) with openings above the bumps. The width of the sepn. of the opening walls is less than the width of the bumps, and the sepn. between the bumps is less than that between adjacent walls of adjacent openings. A flowable alloy (44) is deposited into the openings, filling the width between the walls and the mask is completely removed. Also claimed is a method as above of forming a row of aligned conductive pads with the widths above being referred to the axis of pad alignment. Further claimed is a method as above of physically and electrically connecting at least one TAB lead with a bump comprising forming the bumps as above, depositing the flowable alloy, and placing the TAB lead on the alloy.

USE/ADVANTAGE - Methods of forming a conductive pad pattern on semiconductor devices and for TAB bonding to them (claimed) are provided which are useful for electronic equipment. Close spacing is possible without **Sn whiskers** being formed and excess material from the passive side of the substrate is removed chemically.

ee
10-12/19

L14 ANSWER 5 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1992-092149 [12] WPIX
DNN N1992-068901 DNC C1992-042688
TI Resistor element having positive temp. coefft. - contains vanadium tri oxide to which chromium , aluminium , zirconium , hafnium, tungsten and/or tin , and whiskers are added.
DC L03 R41 V01
PA (MEID) MEIDENSHA CORP
CYC 1
PI JP 04035001 A 19920205 (199212)* 7p
ADT JP 04035001 A JP 1990-142498 19900531
PRAI JP 1990-142498 19900531
AB JP 04035001 A UPAB: 19931006
The resistor element contains V2O3, as a main component, to which 2-40 wt.% at least one of Cr, Al, Zr, Hf, W, and Sn, and whiskers are added.
USE - Used for current-limiting element. Element has thermal shock resistance.
1/3

L14 ANSWER 6 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1991-349671 [48] WPIX
CR 1991-349668 [48]; 1991-349669 [48]; 1991-349670 [48]; 1991-374268 [51]
DNN N1998-171184 DNC C1998-068612
TI Semiconductor MISFET integrated circuit SRAM - has two semiconductor strips formed integral with drive MISFET gate electrodes for cell drive MISFET drains connection and partially overlapped by orthogonal select lines formed integrally with transfer MISFET gate electrodes.
DC U13 U14
IN HASHIBA, S; HASHIMOTO, N; IKEDA, S; ISHIBASHI, K; KOIKE, A; KURAMOTO, I; MEGURO, S; MORIWAKI, N; SASAKI, K; YAMANAKA, T; HIRAISHI, A; KOBAYASHI, Y; TAKAHASHI, S; YUKUTAKE, S
PA (IKED-I) IKEDA S; (HITA) HITACHI LTD
CYC 3
PI JP 03234058 A 19911018 (199148)*
US 5239196 A 19930824 (199335)B 88p
US 5572480 A 19961105 (199650) 85p
US 5652457 A 19970729 (199736) 87p
US 5656836 A 19970812 (199738) 87p
US 5700704 A 19971223 (199806) 85p
US 5731219 A 19980324 (199819) 86p
US 5767554 A 19980616 (199831)
US 5834851 A 19981110 (199901)
KR 199259 B1 19990615 (200059)
KR 199260 B1 19990615 (200059)
KR 201181 B1 19990615 (200060)
KR 201182 B1 19990615 (200060)
KR 201183 B1 19990615 (200060)
KR 201184 B1 19990615 (200060)
ADT JP 03234058 A JP 1990-30454 19900209; US 5239196 A US 1991-653493 19910211; US 5572480 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-459961 19950602; US 5652457 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, US 1994-351173 19941130; US 5656836 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460129 19950602; US 5700704 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US

1994-351173 19941130, US 1995-458615 19950602; US 5731219 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458616 19950602; US 5767554 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460639 19950602; US 5834851 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460641 19950602; KR 199259 B1 Div ex KR 1991-1844 19910204, KR 1996-2597 19960203; KR 199260 B1 Div ex KR 1991-1844 19910204, KR 1996-2598 19960203; KR 201181 B1 Div ex KR 1991-1844 19910204, KR 1996-2594 19960203; KR 201182 B1 Div ex KR 1991-1844 19910204, KR 1996-2596 19960203; KR 201183 B1 Div ex KR 1991-1844 19910204, KR 1996-2595 19960203; KR 201184 B1 Div ex KR 1991-1844 19910204, KR 1996-2593 19960203

FDT US 5239196 A JP 03234055, JP 03234056, JP 03234057, JP 03234058; US 5572480 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5652457 A Div ex US 5239196; US 5656836 A Div ex US 5239196; US 5700704 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5731219 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196, Div ex US 5652457; US 5767554 A Div ex US 5239196, Div ex US 5652457; US 5834851 A Div ex US 5239196, Div ex US 5652457

PRAI JP 1990-30454 19900209; JP 1990-30451 19900209; JP 1990-30452 19900209; JP 1990-30453 19900209; JP 1990-49312 19900302

AB JP 03234058 A UPAB: 20001123

In or Bi gp. solder is soldered on a portion of a Sn plated external terminal of a semiconductor package. The package is held for several hours in a fixed atmosphere, then the surface of the terminal is confirmed.

ADVANTAGE - The method improves total system using the semiconductor package, since the solder accelerates generation or growth of **Sn whisker** in a short time.

In an example, Sn was plated on an external terminal of a semiconductor package; a solder (e.g. In-Sn eutectic alloy) was adhered on a sheeting plane, held for several days or weeks at 50 deg. C, while generation or growth of whisker was observed. 25.0% **Sn whisker** was generated with 0.40 mm of maximum length by the 48th hour and 81.0% with 0.80 mm length by the 336th hour. A terminal not treated with the solder grew no **Sn whiskers**. @(4pp Dwg.No.2/2)@

L14 ANSWER 7 OF 31 WPIX (C) 2002 THOMSON DERWENT

AN 1991-349670 [48] WPIX

CR 1991-349668 [48]; 1991-349669 [48]; 1991-349671 [48]; 1991-374268 [51]

DNN N1998-171184 DNC C1998-068612

TI Semiconductor MISFET integrated circuit SRAM - has two semiconductor strips formed integral with drive MISFET gate electrodes for cell drive MISFET drains connection and partially overlapped by orthogonal select lines formed integrally with transfer MISFET gate electrodes.

DC U13 U14

IN HASHIBA, S; HASHIMOTO, N; IKEDA, S; ISHIBASHI, K; KOIKE, A; KURAMOTO, I; MEGURO, S; MORIWAKI, N; SASAKI, K; YAMANAKA, T; HIRAISHI, A; KOBAYASHI, Y; TAKAHASHI, S; YUKUTAKE, S

PA (IKED-I) IKEDA S; (HITA) HITACHI LTD

CYC 3

PI

JP 03234057	A	19911018	(199148)*	
US 5239196	A	19930824	(199335)B	88p
US 5572480	A	19961105	(199650)	85p
US 5652457	A	19970729	(199736)	87p
US 5656836	A	19970812	(199738)	87p
US 5700704	A	19971223	(199806)	85p
US 5731219	A	19980324	(199819)	86p

US 5767554 A 19980616 (199831)
US 5834851 A 19981110 (199901)
KR 199259 B1 19990615 (200059)
KR 199260 B1 19990615 (200059)
KR 201181 B1 19990615 (200060)
KR 201182 B1 19990615 (200060)
KR 201183 B1 19990615 (200060)
KR 201184 B1 19990615 (200060)

ADT JP 03234057 A JP 1990-30453 19900209; US 5239196 A US 1991-653493 19910211; US 5572480 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-459961 19950602; US 5652457 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, US 1994-351173 19941130; US 5656836 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460129 19950602; US 5700704 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458615 19950602; US 5731219 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458616 19950602; US 5767554 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460639 19950602; US 5834851 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460641 19950602; KR 199259 B1 Div ex KR 1991-1844 19910204, KR 1996-2597 19960203; KR 199260 B1 Div ex KR 1991-1844 19910204, KR 1996-2598 19960203; KR 201181 B1 Div ex KR 1991-1844 19910204, KR 1996-2594 19960203; KR 201182 B1 Div ex KR 1991-1844 19910204, KR 1996-2596 19960203; KR 201183 B1 Div ex KR 1991-1844 19910204, KR 1996-2595 19960203; KR 201184 B1 Div ex KR 1991-1844 19910204, KR 1996-2593 19960203

FDT US 5239196 A JP 03234055, JP 03234056, JP 03234057, JP 03234058; US 5572480 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5652457 A Div ex US 5239196; US 5656836 A Div ex US 5239196; US 5700704 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5731219 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196, Div ex US 5652457; US 5767554 A Div ex US 5239196, Div ex US 5652457; US 5834851 A Div ex US 5239196, Div ex US 5652457

PRAI JP 1990-30453 19900209; JP 1990-30451 19900209; JP 1990-30452 19900209; JP 1990-30454 19900209; JP 1990-49312 19900302

AB JP 03234057 A UPAB: 20001123
In or Bi gp. solder is soldered on a portion of a Sn plated external terminal of a semiconductor package. The package is held for several hours in a fixed atmosphere, then the surface of the terminal is confirmed.

ADVANTAGE - The method improves total system using the semiconductor package, since the solder accelerates generation or growth of **Sn whisker** in a short time.

In an example, Sn was plated on an external terminal of a semiconductor package; a solder (e.g. In-Sn eutectic alloy) was adhered on a sheeting plane, held for several days or weeks at 50 deg. C, while generation or growth of whisker was observed. 25.0% **Sn whisker** was generated with 0.40 mm of maximum length by the 48th hour and 81.0% with 0.80 mm length by the 336th hour. A terminal not treated with the solder grew no **Sn whiskers**. @(4pp Dwg.No.2/2)@

L14 ANSWER 8 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1991-349669 [48] WPIX
CR 1991-349668 [48]; 1991-349670 [48]; 1991-349671 [48]; 1991-374268 [51]
DNN N1998-171184 DNC C1998-068612
TI Semiconductor MISFET integrated circuit SRAM - has two semiconductor

strips formed integral with drive MISFET gate electrodes for cell drive MISFET drains connection and partially overlapped by orthogonal select lines formed integrally with transfer MISFET gate electrodes.

DC U13 U14

IN HASHIBA, S; HASHIMOTO, N; IKEDA, S; ISHIBASHI, K; KOIKE, A; KURAMOTO, I; MEGURO, S; MORIWAKI, N; SASAKI, K; YAMANAKA, T; HIRAISHI, A; KOBAYASHI, Y; TAKAHASHI, S; YUKUTAKE, S

PA (IKED-I) IKEDA S; (HITA) HITACHI LTD

CYC 3

PI

JP 03234056	A	19911018 (199148)*		
US 5239196	A	19930824 (199335)	B	88p
US 5572480	A	19961105 (199650)		85p
US 5652457	A	19970729 (199736)		87p
US 5656836	A	19970812 (199738)		87p
US 5700704	A	19971223 (199806)		85p
US 5731219	A	19980324 (199819)		86p
US 5767554	A	19980616 (199831)		
US 5834851	A	19981110 (199901)		
KR 199259	B1	19990615 (200059)		
KR 199260	B1	19990615 (200059)		
KR 201181	B1	19990615 (200060)		
KR 201182	B1	19990615 (200060)		
KR 201183	B1	19990615 (200060)		
KR 201184	B1	19990615 (200060)		

ADT JP 03234056 A JP 1990-30452 19900209; US 5239196 A US 1991-653493 19910211; US 5572480 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-459961 19950602; US 5652457 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, US 1994-351173 19941130; US 5656836 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460129 19950602; US 5700704 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458615 19950602; US 5731219 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458616 19950602; US 5767554 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460639 19950602; US 5834851 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460641 19950602; KR 199259 B1 Div ex KR 1991-1844 19910204, KR 1996-2597 19960203; KR 199260 B1 Div ex KR 1991-1844 19910204, KR 1996-2598 19960203; KR 201181 B1 Div ex KR 1991-1844 19910204, KR 1996-2594 19960203; KR 201182 B1 Div ex KR 1991-1844 19910204, KR 1996-2596 19960203; KR 201183 B1 Div ex KR 1991-1844 19910204, KR 1996-2595 19960203; KR 201184 B1 Div ex KR 1991-1844 19910204, KR 1996-2593 19960203

FDT US 5239196 A JP 03234055, JP 03234056, JP 03234057, JP 03234058; US 5572480 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5652457 A Div ex US 5239196; US 5656836 A Div ex US 5239196; US 5700704 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5731219 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196, Div ex US 5652457; US 5767554 A Div ex US 5239196, Div ex US 5652457; US 5834851 A Div ex US 5239196, Div ex US 5652457

PRAI JP 1990-30452 19900209; JP 1990-30451 19900209; JP 1990-30453 19900209; JP 1990-30454 19900209; JP 1990-49312 19900302

AB JP 03234056 A UPAB: 20001123

In or Bi gp. solder is soldered on a portion of a Sn plated external terminal of a semiconductor package. The package is held for several hours in a fixed atmosphere, then the surface of the terminal is confirmed.

ADVANTAGE - The method improves total system using the semiconductor

package, since the solder accelerates generation or growth of **Sn whisker** in a short time.

In an example, Sn was plated on an external terminal of a semiconductor package; a solder (e.g. In-Sn eutectic alloy) was adhered on a sheeting plane, held for several days or weeks at 50 deg. C, while generation or growth of whisker was observed. 25.0% **Sn whisker** was generated with 0.40 mm of maximum length by the 48th hour and 81.0% with 0.80 mm length by the 336th hour. A terminal not treated with the solder grew no **Sn whiskers**. @(4pp Dwg.No.2/2)@

L14 ANSWER 9 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1991-349668 [48] WPIX
CR 1991-349669 [48]; 1991-349670 [48]; 1991-349671 [48]; 1991-374268 [51]
DNN N1998-171184 DNC C1998-068612
TI Semiconductor MISFET integrated circuit SRAM - has two semiconductor strips formed integral with drive MISFET gate electrodes for cell drive MISFET drains connection and partially overlapped by orthogonal select lines formed integrally with transfer MISFET gate electrodes.
DC U13 U14
IN HASHIBA, S; HASHIMOTO, N; IKEDA, S; ISHIBASHI, K; KOIKE, A; KURAMOTO, I; MEGURO, S; MORIWAKI, N; SASAKI, K; YAMANAKA, T; HIRAISHI, A; KOBAYASHI, Y; TAKAHASHI, S; YUKUTAKE, S
PA (IKED-I) IKEDA S; (HITA) HITACHI LTD
CYC 3
PI

JP 03234055	A	19911018 (199148)*		
US 5239196	A	19930824 (199335)B		88p
US 5572480	A	19961105 (199650)		85p
US 5652457	A	19970729 (199736)		87p
US 5656836	A	19970812 (199738)		87p
US 5700704	A	19971223 (199806)		85p
US 5731219	A	19980324 (199819)		86p
US 5767554	A	19980616 (199831)		
US 5834851	A	19981110 (199901)		
KR 199258	B1	19990615 (200059)		
KR 199259	B1	19990615 (200059)		
KR 199260	B1	19990615 (200059)		
KR 201181	B1	19990615 (200060)		
KR 201182	B1	19990615 (200060)		
KR 201183	B1	19990615 (200060)		
KR 201184	B1	19990615 (200060)		

ADT JP 03234055 A JP 1990-30451 19900209; US 5239196 A US 1991-653493 19910211; US 5572480 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-459961 19950602; US 5652457 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, US 1994-351173 19941130; US 5656836 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460129 19950602; US 5700704 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458615 19950602; US 5731219 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-458616 19950602; US 5767554 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460639 19950602; US 5834851 A Div ex US 1991-653493 19910211, Cont of US 1993-11249 19930129, Div ex US 1994-351173 19941130, US 1995-460641 19950602; KR 199258 B1 KR 1991-1844 19910204; KR 199259 B1 Div ex KR 1991-1844 19910204, KR 1996-2597 19960203; KR 199260 B1 Div ex KR 1991-1844 19910204, KR 1996-2598 19960203; KR 201181 B1 Div ex KR 1991-1844 19910204, KR 1996-2594

19960203; KR 201182 B1 Div ex KR 1991-1844 19910204, KR 1996-2596 19960203; KR 201183 B1 Div ex KR 1991-1844 19910204, KR 1996-2595 19960203; KR 201184 B1 Div ex KR 1991-1844 19910204, KR 1996-2593 19960203

FDT US 5239196 A JP 03234055, JP 03234056, JP 03234057, JP 03234058; US 5572480 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5652457 A Div ex US 5239196; US 5656836 A Div ex US 5239196; US 5700704 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196; US 5731219 A JP 03234055, JP 03234056, JP 03234057, JP 03234058, Div ex US 5239196, Div ex US 5652457; US 5767554 A Div ex US 5239196, Div ex US 5652457; US 5834851 A Div ex US 5239196, Div ex US 5652457

PRAI JP 1990-30451 19900209; JP 1990-30452 19900209; JP 1990-30453 19900209; JP 1990-30454 19900209; JP 1990-49312 19900302

AB JP 03234055 A UPAB: 20001123

In or Bi gp. solder is soldered on a portion of a Sn plated external terminal of a semiconductor package. The package is held for several hours in a fixed atmosphere, then the surface of the terminal is confirmed.

ADVANTAGE - The method improves total system using the semiconductor package, since the solder accelerates generation or growth of **Sn whisker** in a short time.

In an example, Sn was plated on an external terminal of a semiconductor package; a solder (e.g. In-Sn eutectic alloy) was adhered on a sheeting plane, held for several days or weeks at 50 deg. C, while generation or growth of whisker was observed. 25.0% **Sn whisker** was generated with 0.40 mm of maximum length by the 48th hour and 81.0% with 0.80 mm length by the 336th hour. A terminal not treated with the solder grew no **Sn whiskers**. @(4pp Dwg.No.2/2)@

L14 ANSWER 10 OF 31 WPIX (C) 2002 THOMSON DERWENT

AN 1991-349663 [48] WPIX

DNN N1991-267753 DNC C1991-150839

TI Surface testing of terminal of semiconductor package - by applying indium- or bismuth-gp. solder to tin-plated terminal and maintaining for several hours in fixed atmos..

DC L03 M23 P55 U11

PA (FUIT) FUJITSU LTD

CYC 1

PI JP 03234050 A 19901018 (199148)*

ADT JP 03234050 A JP 1990-30116 19900209

PRAI JP 1990-30116 19900209

AB JP 03234050 A UPAB: 19930928

In or Bi gp. solder is soldered on a portion of a Sn plated external terminal of a semiconductor package. The package is held for several hours in a fixed atmosphere, then the surface of the terminal is confirmed.

ADVANTAGE - The method improves total system using the semiconductor package, since the solder accelerates generation or growth of **Sn whisker** in a short time.

In an example, Sn was plated on an external terminal of a semiconductor package; a solder (e.g. In-Sn eutectic alloy) was adhered on a sheeting plane, held for several days or weeks at 50 deg. C, while generation or growth of whisker was observed. 25.0% **Sn whisker** was generated with 0.40 mm of maximum length by the 48th hour and 81.0% with 0.80 mm length by the 336th hour. A terminal not treated with the solder grew no **Sn whiskers**.

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L14 ANSWER 11 OF 31 WPIX (C) 2002 THOMSON DERWENT

AN 1991-349662 [48] WPIX

TI Surface treatment of semiconductor package external terminal - prevents

generation of **tin whisker** without giving thermal shock to package by heat diffusing solder NoAbstract Dwg 2/4.
DC L03 U11
PA (FUIT) FUJITSU LTD
CYC 1
PI JP 03234049 A 19911018 (199148)*
ADT JP 03234049 A JP 1990-30115 19900209
PRAI JP 1990-30115 19900209

L14 ANSWER 12 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1991-113357 [16] WPIX
DNN N1991-087298 DNC C1991-048711
TI Plastic eraser compsn. for removing ink marks etc. - obtd. by mixing base e.g. PVC with silicon nitride and/or carbide whisker for high bending strength.
DC A84 P77
PA (TOMB-N) TOMBOWENPITSU KK
CYC 1
PI JP 03054000 A 19910307 (199116)*
ADT JP 03054000 A JP 1989-190846 19890724
PRAI JP 1989-190846 19890724
AB JP 03054000 A UPAB: 19930928
Eraser compsn is obtd by mixing a plastice base, such as PVC, vinyl chloride-vinyl acetate copolymer, etc, with Si nitride whisker and/or Si carbide whisker, together with thermoplastic elastomers, a stabiliser, a pigment, a perfume, etc.
Pref mixing proportion of the whiskers in the plastic erasing compsn is 3-35 wt%. The dia and length of the Si nitride and carbide whiskers used are 0.1-1 microns for **SN whisker** and 0.05-1.50 microns for SC whisker and 10-200 microns for **SN whisker** and 20-200 microns for SC whisker, respectively.
USE/ADVANTAGE - The compsn can effectively erase letters, marks, etc, written by oil ball-point pens or printed by electronic duplicators, etc, and has excellent bending strength.

L14 ANSWER 13 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1990-085047 [12] WPIX
DNN N1990-065631
TI Lead frame tape manufacturing system for automated bonding - provides layer of gold on each beam lead and predetermined amount of tin on exposed part of each lead for eutectic bonding.
DC P55 U11
IN PHY, W S
PA (NASE-N) NAT SEMICOND; (NASC) NAT SEMICONDUCTOR CORP
CYC 8
PI EP 359228 A 19900321 (199012)* EN 10p
R: DE FR GB IT NL
JP 02209742 A 19900821 (199039)
US 5008997 A 19910423 (199120)
KR 165883 B1 19990201 (200039)
ADT EP 359228 A EP 1989-116951 19890913; JP 02209742 A JP 1989-240842 19890916; US 5008997 A US 1989-443011 19891128; KR 165883 B1 KR 1989-13180 19890912
PRAI US 1988-245864 19880916
AB EP 359228 A UPAB: 19930928
A metal mask is etched from molybdenum foil to form a strip (34) which corresponds to the length of bonding tape required. The bonding tape is a two-layer tape with a copper film on a polyimide backing. Registration holes (38) in the mask provide alignment with the tape. Gold is plated to

cover the upper copper surface of the tape.

The tape is inverted and brought into contact with the mask so that a short portion (44) of the end of each lead (42) projects into a central window (36) of the mask. A predetermined amount of tin is sputtered onto the lead end portions exposed in the mask window.

ADVANTAGE - The correct amount of tin is deposited to ensure that it is all consumed in the formation of a gold-tin eutectic bond so that no pure tin remains at the leaad-tdie bump connection. This avoids the risk of formation of **tin whiskers** which cause shorting and noise in pin tests.

2E/4

L14 ANSWER 14 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1990-046124 [07] WPIX
DNN N1990-035418 DNC C1990-020045
TI Solder for electronic circuits - contains lead and/or antimony, silver and tin.
DC L03 M23 M26 P55 U11 U14 V04 X24
IN HARADA, M; KOBAYASHI, F; OSHIMA, M; SASAKI, H; SATOH, R; SHIRAI, M; TAKENAKA, T
PA (HITA) HITACHI LTD
CYC 6
PI EP 354392 A 19900214 (199007)* EN 9p
R: DE FR GB
JP 02041794 A 19900209 (199012)
CN 1039987 A 19900228 (199048)
KR 9302154 B1 19930327 (199419)
ADT EP 354392 A EP 1989-113240 19890719; JP 02041794 A JP 1988-109145 19880729; KR 9302154 B1 KR 1989-10303 19890720
PRAI JP 1988-190145 19880729
AB EP 354392 A UPAB: 19930928
Solder contg. Pb and/or Sb, Ag and Sn has a compsn. capable of suppressing the low temp. transformation of Sn, the migration of Ag and the growth of **Sn whiskers**, and the occurrence of corrosion.

A specific solder contains (in wt. %) 0.01-2.0% Pb and/or 0.01-0.5% Sb, 2.0-8.0% Ag and the balance Sn.

USE - In banding parts in an electronic circuit. (claimed).

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L14 ANSWER 15 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1989-098183 [13] WPIX
DNN N1989-074638 DNC C1989-043600
TI Organo metallic lead finish for TAB - obtd. by precleaning leads, treating with sodium carbonate soln., treating with solns. of heterocyclic organic cpds., etc..
DC E13 L03 M14 M23 P55 U11
PA (ANON) ANONYMOUS
CYC 1
PI RD 298007 A 19890210 (198913)*
PRAI RD 1989-298007 19890120
AB RD 298007 A UPAB: 19930923
Tape automated bonding (TAB) device leads are either Sn plated or Au plated to enhance solderability to the substrate. Sn leads is susceptible to whisker growth, and Au plating can cause joint embrittlement depending upon the initial Au thickness on the leads, the solder vol. and the number of repairs experienced.

The method eliminates the use of Sn and Au as the lead surface finish materials while retaining solderability. TAB device leads are precleaned with dilute sodium or potassium pH soln. dilute HCl acid, followed by a

treatment of dilute sodium soln. The leads are then treated with dil. solns. of known heterocyclic organic cpds. such as benzotriazole, imidazoles, etc. at about 50 deg. C. The Cu on the leads forms a thin layer of organometallic cpd. that acts as a barrier to the corrosive elements in the ambient. During soldering, the organometallic complexes volatilise or decompose at interconnection temp. on reaction with flux, and leave behind fresh Cu surface for joint formation.

ADVANTAGE - Method eliminates Au/Sn plating and associated costs, provides longer shelf life, elimination of **Sn whisker** growth, Au embrittlement, and a reliable solder joint.

L14 ANSWER 16 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1986-103851 [16] WPIX
DNC C1986-044484
TI Fibre reinforced copper based material - contains titanium boride or nitride whiskers or short fibres.
DC L03 M22
PA (NPDE) NIPPONDENSO CO LTD
CYC 1
PI JP 61048542 A 19860310 (198616)* 6p
PRAI JP 1984-168674 19840810
AB JP 61048542 A UPAB: 19930922

The composite material is composed of fibres consisting mainly of TiB2 or **TiN whiskers** or short fibres, and a Cu matrix which fills the space between fibres which are totally non-oriented. The electric conductivity is 4x10power 5 S/cm or over, and the thermal expansion coefft. is 15x10poer(-6) deg.C or under.

The fibres have a conductivity of 10 power 3 S/cm or over, and the thermal conductivity is 6x10power(-6) deg.C or under. The aspect ratio of the fibres is pref. of 20-100.

USE/ADVANTAGE - Used for supporting electrodes of semiconductor devices, and if used as the electrode, there are not problems of peeling off at laminated surfaces which has been seen in conventional electrodes on repeated thermal stressing or cutting.

In an example fibre reinforced Cucomposite is made by pouring Cu melt heated at 1200-1300 deg.C into metal mould in which TiB2 whisker (0.1-1 microns dia., 20-100 microns length, obtd. by vapour phase method) premoulded by pressing with uniaxial press in another metal mould, was transferred. This is followed by preheating at 800-1000 deg.C, with forced impregnation of Cu melt between fibres using 500 kg/cm2 pressure plunger, and cooling to 30x15x15 m size composite material. The content of fibre is 38 vol%, electrical conductivity 4.1x10power5 S/cm, and thermal conductivity of 2.7 W/cm deg.C (thermal expansion coefft. of 8.0x10power(-6)/deg.C).

0/6

L14 ANSWER 17 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1983-42861K [18] WPIX
TI Cpd. semiconductor element mount structure - using gold-tin-lead solder to mount e.g. gallium arsenide cpd. laser chip on sub-mount without **tin whisker** formation. NoAbstract.
DC L03 U11 U12 V08
PA (HITA) HITACHI LTD
CYC 1
PI JP 58051584 A 19830326 (198318)* 2p
PRAI JP 1981-149437 19810924

L14 ANSWER 18 OF 31 WPIX (C) 2002 THOMSON DERWENT
AN 1982-47982E [23] WPIX

TI Bismuth chelate salt compsn. - esp. for use in acid tin electroplating bath, comprises bismuth sulphate gluconate.
DC E12 M11
IN WILSON, H P
PA (VULC) VULCAN MATERIALS CO
CYC 2
PI US 4331518 A 19820525 (198223)* 5p
CA 1179964 A 19841227 (198505)
PRAI US 1981-223713 19810109
AB US 4331518 A UPAB: 19930915
A compsn. for use in plating of a bismuth-contg. alloy comprises an aq. soln. of a chelate salt comprising bismuth sulphate gluconate.
Specifically claimed is an aq., acidic, Sn-Bi alloy electroplating soln. contg. tin ions (pref. 10-75 g/l), free sulphuric acid (pref. 140-215 g-l) and bismuth sulphate gluconate (pref. 0.06-21.15 g/l expressed as bismuth metal).
The chelate salt can be used in acidic tin electroplating baths to give a tin electroplate which is resistant to the effects of tin pest and the formation of **tin whiskers**.

L14 ANSWER 19 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1995-297237 JAPIO
TI MANUFACTURE OF TAPE CARRIER FOR TAB
IN GOTO MAKOTO; OKABE HIROYUKI
PA HITACHI CABLE LTD, JP (CO 000512)
PI JP 07297237 A 19951110 Heisei
AI JP1994-108943 (JP06108943 Heisei) 19940425
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 95, No. 11
AB PURPOSE: To eliminate the shorting faults between leads which are caused by **tin whiskers**, by applying an ultrasonic cleaning to the surface of a tape fitted with a pattern after its plating treatment before its heat treatment.
CONSTITUTION: As an electroless deposition treatment, the plating equipment of a reel to reel method is used, and after a pretreatment, a tape fitted with a pattern is dipped into an organic acid bath wherein tin is dissolved at a temperature of 50-70.degree.C for 5-10 minutes, and thereby, it is plated with tin. Thereafter, as an ultrasonic cleaning treatment, the tape fitted with a pattern is subjected to the ultrasonic cleaning using an ionic water at the oscillation frequency of 42kHz for 40-50 seconds. Subsequently, the tape fitted with a pattern whereto the tin plating is applied is subjected to aftertreatment of cleaning by water and to a drying treatment, and thereafter, as a heat treatment, it is heated in an atmospheric thermostat at a heat treatment temperature of 100-150.degree.C for 1-2hours. Thereby, the possibility of the shorting faults between leads which are caused by **tin whiskers** generated in the plating treatment is eliminated, and as a result, the reliability of the tape fitted with a pattern can be improved.

L14 ANSWER 20 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1995-161773 JAPIO
TI MANUFACTURE OF TAPE CARRIER FOR TAB PLATED WITH TIN ELECTROLESSLY
IN GOTO MAKOTO; YOSHIOKA OSAMU; OKABE NORIO
PA HITACHI CABLE LTD, JP (CO 000512)
PI JP 07161773 A 19950623 Heisei
AI JP1993-355315 (JP05355315 Heisei) 19931202
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 95, No. 6
AB PURPOSE: To prevent generation of **tin whiskers** by a

method wherein a lead pattern is treated by acid pickling using the mixture of alkanolsulfonic acid and phenolsulfonic acid after tin-plating has been provided.
CONSTITUTION: Electroless tin plating of 0.5 to 1.0.mu.m is provided on the copper lead on the surface of a TAB tape carrier at the liquid temperature of 60 .+-.1.degree.C for the dipping period of 4 to 6 minutes. An acid pickling treatment is conducted on the non-electrolytic tin-plated TAB tape carrier by dipping for one minute in the mixed solution of alkanolsulfonic acid and phenolsulfonic acid of liquid concentration of 30vol% and liquid temperature of. **Tin whiskers** can be removed efficiently by setting the temperature of the acidic solution and the treatment time for the acid pickling treatment in accordance with the state of generation of the **tin whiskers**. As a result, short circuit is not generated between leads by the growth of **tin whiskers**, and high reliability can be obtained for the TAB tape carrier.

L14 ANSWER 21 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1994-013435 JAPIO
TI CARRIER TAPE AND MANUFACTURING METHOD THEREOF
IN GOTO MAKOTO; YOSHIOKA OSAMU
PA HITACHI CABLE LTD, JP (CO 000512)
PI JP 06013435 A 19940121 Heisei
AI JP1992-165914 (JP04165914 Heisei) 19920624
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1538, Vol. 18, No. 213, P. 6 (19940415)
AB PURPOSE: To prevent effectively the occurrence of a whisker, which is a problem at copper plating, in a carrier tape.
CONSTITUTION: In a TAB carrier tape, a resin film tape is covered with a copper or copper-base alloy foil. In a pulse electrolytic plating method, the copper or copper-based alloy foil is so formed that the (220) face orientation has a 30% or less ratio of X-ray diffraction intensity, which is lower than those of an electrolytic copper foil and a rolled copper foil. Then, the carrier tape can be much improved in **tin whisker** resistance.

L14 ANSWER 22 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1993-330999 JAPIO
TI PRODUCTION OF **TIN WHISKER**
IN YOSHIKAWA SHOICHI; KIDA TORU
PA TOKAI CARBON CO LTD, JP (CO 000304)
PI JP 05330999 A 19931214 Heisei
AI JP1992-161963 (JP04161963 Heisei) 19920528
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No. 1181, Vol. 18, No. 163, P. 36 (19940318)
AB PURPOSE: To efficiently obtain **TiN whisker** with good properties in an industrial way by using an inexpensive, harmless powdery material system.
CONSTITUTION: 100 pts.wt. of a Ti source material comprising titanium dioxide and/or alkali metal titanate is homogeneously incorporated with (A) 50-200 pts.wt. of a carbonaceous material and (B) 1-30 pts.wt. of a catalyst selected from Fe, Ni and Co chlorides. This mixture is then made to react under heating at 1000-1500.degree.C in a nitrogen gas-contg. atmosphere, thus obtaining the **TiN whisker**. The above material system may also be incorporated with sodium chloride as pulverization suppressive material.

L14 ANSWER 23 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1993-102253 JAPIO

TI SEMICONDUCTOR DEVICE
IN YANAGISAWA MASAHIKO
PA SEIKO EPSON CORP, JP (CO 000236)
PI JP 05102253 A 19930423 Heisei
AI JP1991-259334 (JP03259334 Heisei) 19911007
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1417, Vol. 17, No. 453, P. 40 (19930819)
AB PURPOSE: To obtain a semiconductor device where an edge shortcircuit is prevented from occurring between an inner lead and a semiconductor chip, the semiconductor chip is improved in bonding properties, and a large number of pins can be provided to an semiconductor chip.
CONSTITUTION: The inner lead 3 of a tape carrier 1 is covered with an insulating material 12 excluding its surface part which contacts with an electrode. Problems such as an edge shortcirucit are solved, whereby the inner lead 3 is not required to be formed, so that the inner lead 3 can be easily aligned at bonding, and a short-circuit is not induced even if the part of the inner lead 3 other than its part which bears against the electrode comes into contact with the surface of a semiconductor chip 6 due to the positional relation change between the inner lead 3 and the semiconductor element 6 caused by an external force in other processes after a bonding process is finished, and in result a semiconductor chip of this design can be enhanced in reliability. As the inner lead 3 is covered with an insulating material excluding its surface part which contacts with an electrode, **tin whiskers** are prevented from being generated.

L14 ANSWER 24 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1993-074869 JAPIO
TI FILM SUBSTRATE FOR TAPE CARRIER TYPE SEMICONDUCTOR DEVICE AND TAPE CARRIER TYPE SEMICONDUCTOR DEVICE
IN AKIMOTO KOJI; OBUCHI ATSUSHI; MORI HIROYUKI; UENO TATSUAKI
PA HITACHI LTD, JP (CO 000510)
HITACHI DEVICE ENG CO LTD, JP (CO 486661)
PI JP 05074869 A 19930326 Heisei
AI JP1991-234434 (JP03234434 Heisei) 19910913
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1403, Vol. 17, No. 398, P. 138 (19930726)
AB PURPOSE: To judge defects of a film substrate such as the degradation in resolution due to defective etching by setting an interval between wiring patterns to an allowable length of a **tin whisker** and a projection due to defective etching and checking the electrical continuity between the wiring patterns to electrically inspect the length of **tin whiskers** and projections.
CONSTITUTION: Prepared is a film substrate which is to be used for a tape carrier type semiconductor device with a plurality of leads 2 transversely arrayed at a specified interval. This film substrate is provided with adjacent wiring patterns 2D at an interval smaller than that between outer parts of the leads 2. This automatizes the judgment of the film substrate acceptability and improves the reliability of a tape carrier type semiconductor device.

L14 ANSWER 25 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1992-349165 JAPIO
TI FIBER REINFORCED CERAMICS
IN HAYASHI KATSURA; SAKAGAMI MASASHI
PA KYOCERA CORP, JP (CO 358923)
PI JP 04349165 A 19921203 Heisei
AI JP1991-123862 (JP03123862 Heisei) 19910528
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: C, Sect. No.

1051, Vol. 17, No. 2, P. 49 (19930422)
AB PURPOSE: To provide ceramics with high hardness, high toughness and high strength by adding a boron-contg. compound to a matrix consisting essentially of alumina and contg. fibrous substance constituted of titanium whiskers.
CONSTITUTION: A matrix essentially consisting of alumina(Al2O3) and contg. a boron-contg. metallic compound in the ratio of 0.02 to 40wt.% is mixed with at least one kind selected from titanium carbide(TiC) whiskers, titanium nitride(**TiN**) **whiskers** and titanium carbon nitride(TiCN) whiskers in the ratio of 5 to 60wt.% in the total content.

L14 ANSWER 26 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1991-268381 JAPIO
TI SUBMOUNT FOR SEMICONDUCTOR LASER ELEMENT
IN ISHII MITSUO; YAMASHITA KOJI
PA MITSUBISHI ELECTRIC CORP, JP (CO 000601)
PI JP 03268381 A 19911129 Heisei
AI JP1990-67556 (JP02067556 Heisei) 19900316
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1171, Vol. 16, No. 79, P. 114 (19920226)
AB PURPOSE: To suppress that **Sn whiskers** are produced even in a PbSn-based solder, to reduce a change with the passage of time of the surface and to arrange that the quantity of incident light on a monitor PD chip becomes definite by a method wherein a gold layer is formed on the uppermost layer of a barrier layer at a submount.
CONSTITUTION: A submount is composed of a conductive substrate 10; barrier layers 11 and outermost PbSn-based solder layers 12 are formed on both faces of the conductive substrate 10; uppermost layers of the barrier layers 11 are covered with gold layers 13. Consequently, when the PbSn-based solders 12 are melted at the submount for semiconductor laser device use, the gold layers 13 at the uppermost layers of the substratum barrier layers 11 are diffused. Thereby, it is suppressed that **Sn whiskers** are produced and that the solder surface is changed with the passage of time; and thus the incident light on a monitor PD chip becomes definite.

L14 ANSWER 27 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1991-234050 JAPIO
TI SURFACE TESTING METHOD FOR EXTERNAL TERMINAL OF SEMICONDUCTOR PACKAGE
IN WATANABE EIJI; MAKINO YUTAKA
PA FUJITSU LTD, JP (CO 000522)
PI JP 03234050 A 19911018 Heisei
AI JP1990-30116 (JP02030116 Heisei) 19900209
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1154, Vol. 16, No. 14, P. 92 (19920114)
AB PURPOSE: To enable confirmation of creation and growth of **tin whisker** in a short time by adhering an indium series or bismuth series solder to a tin plated external terminal and leaving it as it is under a predetermined environment.
CONSTITUTION: A semiconductor package having tin plated 3 external terminals 2 is mounted on a printed board 4, and then a solder 5 is applied onto the external terminal 2. In this case, an indium series or bismuth series eutectic alloy solder is employed. The semiconductor package 1 is then left as it is for a predetermined time under a predetermined environment. Subsequently, creation and growth of **tin whisker** on the surface of the external terminal 2 is observed.

L14 ANSWER 28 OF 31 JAPIO COPYRIGHT 2002 JPO

AN 1991-234049 JAPIO
TI SURFACE TREATMENT FOR EXTERNAL TERMINAL OF SEMICONDUCTOR PACKAGE
IN WATANABE EIJI; ISHIKAWA TAKESHI
PA FUJITSU LTD, JP (CO 000522)
PI JP 03234049 A 19911018 Heisei
AI JP1990-30115 (JP02030115 Heisei) 19900209
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1154, Vol. 16, No. 14, P. 91 (19920114)
AB PURPOSE: To completely prevent production of **tin whiskers** without giving a heat-shock and the like to a semiconductor package by thermally-diffusing solder affixed to an external terminal of a semiconductor package, over the tinned surface.
CONSTITUTION: An external terminal 2 of a semiconductor package 1 is tinned and inserted to a printed wiring board 4 by solder 5. And, by thermally-diffusing at a temperature not less than a melting point of the solder 5 and not more than a melting point of tin 3, the solder 5 is thermally-diffused and all remaining tinned surface of the external terminal 2 is covered with a diffused solder 5a, and this makes no tinned surface of the external terminal 2 exposed.

L14 ANSWER 29 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1991-227073 JAPIO
TI SEMICONDUCTOR PHOTODETECTIVE ELEMENT
IN TADA KATSUHISA; HATTORI AKIRA
PA MITSUBISHI ELECTRIC CORP, JP (CO 000601)
PI JP 03227073 A 19911008 Heisei
AI JP1990-22929 (JP02022929 Heisei) 19900131
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: E, Sect. No. 1151, Vol. 16, No. 4, P. 53 (19920108)
AB PURPOSE: To prevent a reflected return light from being incident on an LD chip by a method wherein the surface of the metal mask of a metal masked PD is roughened by generating **Sn whiskers** on it to irregularly reflect an irradi ated light.
CONSTITUTION: The surface of the metal mask 3 of a metal masked PD chip is roughened by producing **Sn whiskers** 5 on it to irregularly reflect an irradiat ed light. When the metal masked PD is used as a monitoring PD, even if the metal mask 3 is irradiated with light emitted from the rear of an LD due to the misalignment of the monitoring PD chip or the LD chip in the assembly operation, the light concerned is prevented from returning to the part of the LD where the light is emitted by irregular refraction. By this setup, a return light to an LD can be prevented from adversely affecting a laser oscillation.

L14 ANSWER 30 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1990-041794 JAPIO
TI SOLDER ALLOY AND ELECTRONIC CIRCUIT DEVICE FORMED BY USING THE SAME
IN HARADA MASAHIDE; SATO RYOHEI; OSHIMA MUNEO; KOBAYASHI FUMIYUKI; TAKENAKA TAKATSUGU; NEZU TOSHITADA; SHIRAI MITSUGI; SASAKI HIDEAKI
PA HITACHI LTD, JP (CO 000510)
PI JP 02041794 A 19900209 Heisei
AI JP1988-190145 (JP63190145 Heisei) 19880729
SO PATENT ABSTRACTS OF JAPAN, Unexamined Applications, Section: M, Sect. No. 966, Vol. 14, No. 2, P. 49 (19900425)
AB PURPOSE: To prevent the low temp. transformation of Sn, migration and generation of whiskers by adding specific ratios of Pb and Sb to an Sn-Ag solder alloy having a specific compsn.
CONSTITUTION: This solder contains, by weight, .gtoreq.1 kinds of 0.01-2.0% Pb and 0.01-0.5% Sb, contains 2.8-8.0 Ag and consists of the balance Sn. The content of the Ag in this solder is specified to

.gtoreq.2.0% in order to assure strength and is confined to .ltoreq.8.0% in order to assure the operating temp. region effective as the solder for connection of an electronic circuit device. The Sb and Pb are added in order to suppress the low temp. transformation of the Sn in the alloy and the generation of the migration of the Ag therein and to prevent the generation and growth of the **Sn whiskers** and to prevent the corrosion. The Sb and Pb harden the alloy. The alloy is brittle f the contents are >0.5% Sb and >2.0% Pb. The above-mentioned effect is not observed if the content is <0.01%.

L14 ANSWER 31 OF 31 JAPIO COPYRIGHT 2002 JPO
AN 1987-077481 JAPIO
TI METHOD FOR PREVENTING GROWTH OF **TIN WHISKER**
IN IGOORU BUI KADEIJIYA; JIYURIUSU SHII FUISUTAA; JIYOSEFU UINTAA; AABINDO PAASASARASHI
PA OLIN CORP, US (CO 000716)
PI JP 62077481 A 19870409 Showa
AI JP1986-182875 (JP61182875 Showa) 19860805
PRAI US 1985-762177 19850805
US 1986-879118 19860703

L27 ANSWER 4 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 2002-037380 [05] WPIX
DNN N2002-028882
TI Wiring board for semiconductor package, has **nickel alloy layers** and another **metal layer**, whose thickness ranges from 0.03 to 0.5 **micrometer**, which are sequentially layered to connection pad.
DC V04
PA (KYOC) KYOCERA CORP
PI JP 2001244363 A 20010907 (200205)* 9p
ADT JP 2001244363 A JP 2000-51680 20000228
PRAI JP 2000-51680 20000228
AB JP2001244363 A UPAB: 20020123
NOVELTY - A gap is formed bear the peripheral edge of a connection pad (6). **Nickel alloy** layers (9,10) and another **metal layer** (11), whose thickness ranges from 0.03 to 0.5 **micrometer**, are sequentially layered to the connection pad.
USE - For semiconductor package.
ADVANTAGE - Ensures reliable and stable electrical connection of connection pad and circuit wiring of external circuit substrate.
DESCRIPTION OF DRAWING(S) - The figure shows the expanded sectional view of relevant part of wiring board.
Connection pad 6
Nickel alloy layers 9,10
Metal layer 11
Dwg.4/4

L27 ANSWER 5 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 2001-608950 [70] WPIX
DNN N2001-454750 DNC C2001-181229
TI Planar shaped mandrel for forming lenticular sheet used in three dimensional display of stereo printing, is formed by cutting concave portion in **metal** plating **layer** formed on cylinder through peeling layer.
DC M11 P54 P81
PA (TOPP) TOPPAN PRINTING CO LTD
CYC 1
PI JP 2001172780 A 20010626 (200170)* 9p
ADT JP 2001172780 A JP 1999-356171 19991215
PRAI JP 1999-356171 19991215
AB JP2001172780 A UPAB: 20011129
NOVELTY - A **metal** plating **layer** is formed on a cylinder provided with a peeling layer consisting of stainless steel or chrome plating layer. The ends of **metal** plating **layer** is cut. Required dimension on concave portion is formed in **metal** plating **layer**, using engine lathe by moving along axial direction after releasing **tensile stress**. The **metal** plating **layer** formed with the concave, is peeled from cylinder.
USE - For forming lenticular sheet used for three dimensional display of stereo printing, television.
ADVANTAGE - Facilitates the production of lenticular sheet with fixed production process. Forms rib with fixed height from glass surface as the mandrel bends a little. Dimensional accuracy is excellent.
DESCRIPTION OF DRAWING(S) - The figure shows the **metal** plating **film** cutting process.
Dwg.3/4

L27 ANSWER 6 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 2001-551307 [62] WPIX
DNN N2001-409636
TI Deformed metal composite wire, for conducting electricity, has a first metal matrix surrounding filaments made of a second, equal or higher melting point metal, and made by using a cold drawing process.
DC P51 X12
IN BOESMAN, P; BRUNEEL, E; LOBBENS, J; VAN GIEL, F
PA (TREB) BEKAERT NV SA

CYC 95
PI EP 1118397 A1 20010725 (200162)* EN 9p
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
WO 2001053014 A1 20010726 (200162) EN
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
AU 2001023689 A 20010731 (200171)
ADT EP 1118397 A1 EP 2000-200186 20000119; WO 2001053014 A1 WO 2000-EP13208 20001222; AU 2001023689 A AU 2001-23689 20001222
FDT AU 2001023689 A Based on WO 200153014
PRAI EP 2000-200186 20000119
AB EP 1118397 A UPAB: 20011026
NOVELTY - A deformed metal composite wire (14) comprises a matrix (12) of a first metal having a first melting point. The composite wire also comprises two or more filaments (10) of a second or further metal embedded in the matrix (12) and surrounded by the matrix (12). The second or further metal has a melting point which is higher or equal to the first melting point. The wire (14) is in a deformed state so that the two or more filaments (10) have a non-circular filament cross-section.

DETAILED DESCRIPTION - An alloy layer is formed between the first and second metal. The wire is subjected to a final deformation reduction of at least 50 %, and is comprised of up to 27 filaments. The composite wire has a tensile strength of greater than 2000 **MPa**. The matrix is provided using a hot dip process, and the deformation is carried out by cold drawing. The filaments may or may not be twisted prior to providing a matrix around them.

An INDEPENDENT CLAIM is given for a method of manufacturing a composite wire.

USE - As wire used as an electrical conductor.

ADVANTAGE - Is able to be highly deformed (above 90 %), has high tensile strength, high corrosion resistance, high flexibility, and high conductivity.

DESCRIPTION OF DRAWING(S) - The figure shows a cross section of the deformed metal composite wire where the filaments have a separate **metal coating**.

filaments 10
matrix 12
composite wire 14
metallic coating 20
Dwg.3/3

L27 ANSWER 7 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 2000-514222 [46] WPIX
DNN N2000-380012 DNC C2000-153395
TI Production of engineered abrasives involves using super abrasive particles mixed with metal particles in cold-forming process.
DC L02 M26 P61
IN ANDREWS, R M; CARACOSTAS, C A; MILLER, B J
PA (NORT) NORTON CO
CYC 1
PI US 6096107 A 20000801 (200046)* 5p
ADT US 6096107 A US 2000-476506 20000103
PRAI US 2000-476506 20000103
AB US 6096107 A UPAB: 20000921

NOVELTY - Engineered abrasives are produced by forming powder mixture of particles of super abrasive and bonding metal, depositing the mixture as a **layer** on **metal** foil, applying forming pressure to the powder, and sintering the metal particles in composites.

DETAILED DESCRIPTION - Production of engineered abrasive involves forming powder mixture of particles of super abrasive and bonding material, depositing the mixture as a **layer** on **metal** foil supported on rigid surface, applying forming pressure to the powder by forming tool having raised surface pattern, and sintering the metal particles in the composites to a porosity of the structure that is less than 20 %. The applied pressure is sufficient to cause the powder and the metal foil to form a coherent sheet with two major surfaces. The first surface has a raised pattern of metal/super abrasive composites. The pattern is the inverse of the pattern on the forming tool. The second surface is smooth.

USE - For the production of engineered abrasives.

ADVANTAGE - Shape and size of the composite is engineered to provide any desired level of cutting and/or surface finish.

Dwg.0/1

L27 ANSWER 8 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 2000-401127 [35] WPIX
DNN N2000-300351 DNC C2000-121489
TI Electrodes for electrochemical machining of metallic part, have **metal** body **coated** with ceramic or polymer.
DC A85 M11 P54 X25
IN GADOW, R; KILLINGER, A; SCHERER, D F
PA (UYST-N) UNIV STUTTGART INST FERTIGUNGSTECHNOLOGI
CYC 1
PI DE 19854793 A1 20000608 (200035)* 7p
ADT DE 19854793 A1 DE 1998-19854793 19981127
PRAI DE 1998-19854793 19981127
AB DE 19854793 A UPAB: 20000725

NOVELTY - Electrodes for electrochemical machining of metallic parts in an electrolyte have a **metal** body (partly) **coated** with a ceramic layer or a protective coating of silicone resin lacquer, organically modified silicone resin lacquer or a fluoropolymer.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the production of electrodes with a ceramic or (in)organic lacquer coating, by thermal spraying.

USE - Used for electrochemical machining of metals, especially in automatic finishing and also for removing burrs in hardly accessible drilled holes and for machining holes and contours, e.g., annular channels and lubrication grooves.

ADVANTAGE - As electrodes for electrochemical machining must match the geometry of the part to be machined, the insulation must be removed only in the required areas. This is difficult with commercially available electrodes with an injection molded plastics sheath. The present electrodes have better dimensional, mechanical and thermal stability and wear resistance, whilst the insulating coatings have satisfactory electrical resistance, chemical stability towards electrolytes and imperviousness. They can also be made smaller than usual and operate at very high current density, which increases the rate of removal of material and efficiency. They can withstand heating caused by local high current density, as they have higher thermal stability than polymers or bonded structures.

DESCRIPTION OF DRAWING(S) - The drawing shows a longitudinal section through an electrode.

Pencil electrode 10

Metallic part to be machined 12
Position of required annular channel or cavity 14
Electrode body, consisting of seamless stainless steel tube, outside diameter about 2 mm 16
Narrow end welded, e.g., by laser welding and sealed by welded disk 17
Ceramic, e.g., alumina layer, about 100 micro m thick, with low porosity, preferably produced by plasma spraying 18
Thin metallic adhesion promoting layer, e.g., of chromium **nickel alloy**, applied by thermal spraying 20
Protective coating of silicone resin lacquer or fluoropolymer 22
Uninsulated areas 24
Round holes through electrolyte flows into blind hole 26
Electrolyte 28
Blind hole in part to be machined 30
Direction of electrolyte flow inside electrode 32
Dwg.1/2

L27 ANSWER 9 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 2000-064649 [06] WPIX
DNN N2000-050705 DNC C2000-018202
TI Packing yarn as a seal for shaft or spindle passage openings.
DC A88 F02 P73 Q65
IN OETTINGER, O; SCHELLENBERGER, B
PA (SIGE) SGL TECHNIK GMBH
CYC 28
PI EP 967423 A2 19991229 (200006)* DE 20p
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI
DE 19828790 A1 19991230 (200007)
CZ 9902319 A3 20000112 (200009)
JP 2000046191 A 20000218 (200020) 15p
US 6385956 B1 20020514 (200239)
ADT EP 967423 A2 EP 1999-111543 19990615; DE 19828790 A1 DE 1998-19828790 19980627; CZ 9902319 A3 CZ 1999-2319 19990624; JP 2000046191 A JP 1999-175491 19990622; US 6385956 B1 US 1999-344925 19990628
PRAI DE 1998-19828790 19980627
AB EP 967423 A UPAB: 20000203
NOVELTY - The packing yarn is composed of layered ribbons with alternating layers of at least one flexible graphite and a reinforcement layer. The ribbons (9,9',9) of layered materials (10) have a width of not more than 5 mm. The flexible graphite (1,1') has a thickness of not more than 1 mm and a bulk density of 0.7-1.8 g/cm3. Other layers (3,3') are of metal foil with a thickness of 5-50 mu m and a tensile strength of at least 250 **MPa**.

DETAILED DESCRIPTION - The ribbons (9,9',9) have additionally at least one layer of plastics film. The ribbons are given lateral ripples, across their longitudinal axis. The packing yarn (15,17) is composed of at least two ribbons (9,9',9), where at least one is twisted. The ribbons (9,9'9) can be of layers (10) with a width of not more than 3 mm or 2 mm, containing a graphite film (1) with a thickness of not more than 0.5 mm or 0.35 mm. The reinforcement metal foil (3,3') has a thickness of 10-20 mu m. At least one of the outer surfaces of the ribbons (9,9',9) is covered by a bonded plastics film layer. The flexible graphite film (1) has a graphite content or at least 96 wt% or 99 wt%. The metal foil (3,3') is bonded to the graphite film (1) with or without an adhesive, and they can be welded together at a high temp. such as 240-270 deg. C or 350-380 deg. C using a pressure of at least 0.1 **MPa**, using a non-adhesive bonding process as described in EP 0 616 884 B1. The packing yarn is

composed of at least two twisted ribbons (9,9',9) of at least two different material layers, using at least a layer of flexible graphite film (1,1') and at least one metal foil (3,3'), and at least one layer of a flexible graphite film and a plastics film layer with a tensile strength of at least 25 **MPa** and an elasticity module of at least 0.4 GPa. The packing yarn of ribbons (9,9',9), twisted together, contains not more than 12 layers with up to four overlaid layers of flexible graphite film (1,1'), each bonded to a reinforcement **metal** foil **layer** (3,3') and a plastics film layer. An INDEPENDENT CLAIM is included for a production process, where a flexible graphite film (1) is bonded to a reinforcement metal foil (3), and the bonded layers (10) are cut into ribbons (9,9',9). At least two ribbons (9) are twisted together in a textile yarn twisting process to give a twisted packing yarn (15), which is shaped (16) into the required cross section for the final packing yarn (17). Preferred Features: The operation is a continuous process to bond the graphite (1) and **metal** (3) **layers** together in strips. The packing yarn (15) is shaped (16) into a calibrated round, oval, elliptical or rectangular cross section. In addition, at least one of the uncovered surfaces of the flexible graphite film can be covered by a plastics film layer, bonded in place with or without an adhesive. At least three of the ribbons (9,9',9) are twisted together to form a yarn (15), or two ribbons are twisted together. At least one of the bonded ribbons (9) from the bonded web (10) can be twisted into a yarn.

USE - The packing yarn is especially as packing seals for the passage openings for shafts and spindles.

ADVANTAGE - The packing yarn is mainly of graphite which can distort, without the use of fibers, filaments or wires for the reinforcement. It has a high shear strength, and is produced with minimum and simple production stages.

DESCRIPTION OF DRAWING(S) - The drawing shows a schematic view of a continuous or partly-continuous production of the packing yarn.

flexible graphite layers 1,1'
metal foils 3,3'
ribbons 9,9',9
bonded layers 10
coarse packing yarn 15
yarn calibration unit 16
final packing yarn 17
Dwg.1/7

L27 ANSWER 10 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1997-119127 [11] WPIX
DNN N1997-098052
TI Method for producing slide bearing - involves bearing **metal layer** based on copper in copper or copper alloy matrix of softer metallic bearing surfaces of at least 10 weight per cent.
DC Q62
IN RUMPF, T
PA (MIBA-N) MIBA GLEITLAGER AG
CYC 28
PI WO 9703298 A1 19970130 (199711)* DE 12p
RW: AT BE CH DE DK ES FI FR GB GR IE IT LU MC NL PT SE
W: AU BR CN CZ HU JP KR MX PL RU US
AT 9501184 A 19970415 (199721)
AU 9661815 A 19970210 (199724)
AT 403194 B 19971015 (199746)
ADT WO 9703298 A1 WO 1996-AT117 19960704; AT 9501184 A AT 1995-1184 19950712; AU 9661815 A AU 1996-61815 19960704, WO 1996-AT117 19960704; AT 403194 B AT 1995-1184 19950712

FDT AU 9661815 A Based on WO 9703298; AT 403194 B Previous Publ. AT 9501184
PRAI AT 1995-1184 19950712
AB WO 9703298 A UPAB: 19970313
On the prepared bearing **metal layer** (1), a customary diffusion stop layer (6), e.g. of nickel or a nickel-chrome alloy is precipitated to a thickness of e.g. 1 to 2 **micrometers**, in order to prevent diffusion of tin from the running layer into the bearing **metal layer**. This diffusion stop layer can be precipitated galvanically, but can also be applied by a plasma process in vacuum.

On the diffusion stop layer a running layer (7) containing tin, e.g. an aluminium-**tin alloy** with a tin content of 30 weight per cent can be precipitated physically in vacuum. Cavities in the surface of the bearing **metal layer** are formed as pockets (8) in the running surface (9) of the running layer (7). These pockets can receive lubricating oil.

USE/ADVANTAGE - The running properties of the slide bearing, esp. during the running-in phase, are notably improved.
Dwg.3/3

L27 ANSWER 11 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1995-071451 [10] WPIX
DNN N1995-056248
TI Electric contact point material - has gold or gold alloy plated onto contact surface of palladium - ruthenium layer and copper -**nickel alloy** layer.
DC V03 X12
PA (TANI) TANAKA KIKINZOKU KOGYO KK
CYC 1
PI JP 06349370 A 19941222 (199510)* 3p
JP 3070806 B2 20000731 (200041) 2p
ADT JP 06349370 A JP 1993-166269 19930611; JP 3070806 B2 JP 1993-166269 19930611
FDT JP 3070806 B2 Previous Publ. JP 06349370
PRAI JP 1993-166269 19930611
AB JP 06349370 A UPAB: 19950314
The electric contact point material consists of two **layers** of **metals**, the first **layer** being constituted by Pd-Ru alloy and the second layer by Cu-**Ni alloy**. The contact surface of these layers is plated with Au metal or its alloy. The thickness of the gold alloy plating layer is in the order of 0.5- 0.6 **micrometers**.

ADVANTAGE - Has good production and assembly efficiencies. Increases contact life superbly. Improves reliability, production and assembly efficiency. Eases use for relay or switch. Obtains polar degrees of freedom in electric circuit.
Dwg.0/0

L27 ANSWER 12 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1995-046407 [07] WPIX
DNN N1995-036628 DNC C1995-020890
TI Niobium stannide superconductive wire mfr. for NMR apparatus - by depositing niobium stannide **layer** on composite **metal** block on copper -**tin alloy** die and heat treating.
DC L03 S03 X12 X14
PA (KOBM) KOBE STEEL LTD
CYC 1
PI JP 06325643 A 19941125 (199507)* 8p
ADT JP 06325643 A JP 1993-109594 19930511

PRAI JP 1993-109594 19930511
AB JP 06325643 A UPAB: 19950223
The Nb3Sn superconductivity wire manufacturing method involves forming Nb3Sn layer on the boundary faces of a die made from Cu-Sn group alloy and heat treating it. The space between the Nb3Sn layers in the die ranges between 0.5 to 1.0 **micrometers**. Mean distance `dout' is the maximum length of wire that is drawn out from the surface of a composite metal block. The ratio dout/din over mean distance of wire surface is set ranging between 1.5-4.0. Where din is diffusion barrier layer.
USE/ADVANTAGE - For use in superconductivity magnets. Eliminates damping of current.
Dwg.1/9

L27 ANSWER 13 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1994-350907 [44] WPIX
DNN N1994-275339
TI Reflector mfg. procedure, using compsn. material and metallic matrix - includes laying **metal-coated** carbon fibres between **metal layers** and compressing at high temp. to produce reflective compsn. material.
DC P73 P81
IN ABIVEN, H
PA (NRDA) SOC NAT IND AEROSPATIALE
CYC 6
PI EP 624807 A1 19941117 (199444)* FR 12p
R: DE GB IT
FR 2706630 A1 19941223 (199506)
JP 07005312 A 19950110 (199511) 8p
US 5518383 A 19960521 (199626) 8p
US 5564066 A 19961008 (199646) 8p
EP 624807 B1 19980624 (199829) FR
R: DE GB IT
DE 69411228 E 19980730 (199836)
ADT EP 624807 A1 EP 1994-400935 19940429; FR 2706630 A1 FR 1993-5569 19930510; JP 07005312 A JP 1994-96448 19940510; US 5518383 A US 1994-239702 19940509; US 5564066 A Div ex US 1994-239702 19940509, US 1995-450020 19950525; EP 624807 B1 EP 1994-400935 19940429; DE 69411228 E DE 1994-611228 19940429, EP 1994-400935 19940429
FDT DE 69411228 E Based on EP 624807
PRAI FR 1993-5569 19930510
AB EP 624807 A UPAB: 19941223
The procedure consists of applying to the surface of a mould (1) of polished molybdenum, coated with boron nitride, a layer of 99.9 per cent pure aluminium powder (3) 120 microns thick, followed by layers (4-7 and 7'-4') of carbon fibres with a very high module of elasticity, previously metallised by the deposition of pure aluminium in a vapour phase.
The fibres are laid at various angles to one another between 0 and 90 degrees and covered with a further layer (8) of aluminium. The assembly is then consolidated at a temp. of 595 deg.C and a pressure of 25 **MPa** for a period of 25 minutes in a vacuum to produce a compsn. mirror which can be polished as required.
USE/ADVANTAGE - High level of dimensional stability, suitable for use in spacecraft or laser equipment.
Dwg.1/4

L27 ANSWER 14 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1994-173107 [21] WPIX
DNN N1994-136638 DNC C1994-078844
TI Coated sintered alloy having good resistance to chipping - comprises

bonding phase of nickel and/or cobalt, hard layer of carbide and/or nitride of Gp-4A,5A and/or 6A metals, and matrix surface coated by CVD.

DC L02 M22 P54 P56
PA (TTUN) TOSHIBA TUNGALLOY KK
CYC 1
PI JP 06114641 A 19940426 (199421)* 5p
JP 2603177 B2 19970423 (199721) 5p
ADT JP 06114641 A JP 1992-283908 19920929; JP 2603177 B2 JP 1992-283908 19920929
FDT JP 2603177 B2 Previous Publ. JP 06114641
PRAI JP 1992-283908 19920929
AB JP 06114641 A UPAB: 19940715
The coated sintered alloy comprises a sintered alloy comprising 2-12 wt.% bonding phase contg. Ni, Co, or Ni-**Co alloy**, as main components, and balance a hard layer comprising at least one of carbide, nitride of 4a, 5a and 6a gp. metals and their mutual solid soln., on the matrix surface a coating is formed by CVD. To the hard phase at the surface part of the matrix, compressive stress of 30-80 kg/mm2 was imposed, and to the coating, **tensile stress** of upto 20 kg/mm2 was offered.

USE - Used for cutting tools, and wear resistance tools, having good resistance to impact, and to chipping.

Dwg.0/0

L27 ANSWER 15 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1992-142536 [18] WPIX
DNN N1992-106663 DNC C1992-066151
TI Rotary-anode type X-ray tube - includes bearing with liq. metal lubricant and bearing surfaces with **metal** reaction **layer**.
DC L03 M13 V05
IN ANNO, H; KITAMI, T; ONO, K; SUGIURA, H; ATAKE, H; ONU, K
PA (TOKE) TOSHIBA KK
CYC 9
PI EP 482386 A 19920429 (199218)* EN 15p
R: DE FR GB IT
CA 2052472 A 19920420 (199228)
CN 1060738 A 19920429 (199302)
JP 04363844 A 19921216 (199305) 6p
US 5181235 A 19930119 (199306) 12p
CN 1024065 C 19940316 (199525)
KR 9409195 B1 19941001 (199635)
EP 482386 B1 19961211 (199703) EN 12p
R: DE FR GB
DE 69123554 E 19970123 (199709)
CA 2052472 C 19970909 (199749)
ADT EP 482386 A EP 1991-116670 19910930; CA 2052472 A CA 1991-2052472 19910930; CN 1060738 A CN 1991-105217 19910726; JP 04363844 A JP 1991-245890 19910925; US 5181235 A US 1991-766126 19910927; CN 1024065 C CN 1991-105217 19910726; KR 9409195 B1 KR 1991-13393 19910731; EP 482386 B1 EP 1991-116670 19910930; DE 69123554 E DE 1991-623554 19910930, EP 1991-116670 19910930; CA 2052472 C CA 1991-2052472 19910930
FDT DE 69123554 E Based on EP 482386
PRAI JP 1990-279350 19901019
AB EP 482386 A UPAB: 19931006
Rotary anode X-ray tube includes a rotary anode (11) fixed to a cylindrical rotary structure (12) with a stationary shaft (15). A hydrodynamic bearing (19) is formed between the rotary structure and the shaft filled with metal lubricant during rotation, a surface in contact with lubricant being a reaction layer formed with Ga, In, Bi and/or Sn and

having a thickness not below 1 micron.
The surface of the rotary structure and/or shaft on which the reaction layer is formed is pref. Mo, W, Nb or Ta. The lubricant is pref. a Ga-In-Bi-**Sn alloy**.
ADVANTAGE - Stable bearing operation is provided. (1/9)
1/9

L27 ANSWER 16 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1988-050999 [08] WPIX
DNN N1988-038728 DNC C1988-022542
TI Composite structure esp. gas turbine vane - with **metal coating** possessing internal compressive stress to give increased static and fatigue strength.
DC A88 P73 Q51 Q52 Q56
IN LESHANE, J S; ROUTSIS, K; WATSON, C R
PA (UNAC) UNITED TECHNOLOGIES CORP
CYC 8
PI DE 3725686 A 19880218 (198808)* 8p
GB 2194553 A 19880309 (198810)
FR 2602179 A 19880205 (198813)
JP 63042396 A 19880223 (198813)
AU 8776575 A 19880211 (198814)
NO 8703227 A 19880229 (198814)
GB 2194553 B 19910306 (199110)
IL 83425 A 19910310 (199120)
IT 1222432 B 19900905 (199218)
JP 2829606 B2 19981125 (199901) 5p
ADT DE 3725686 A DE 1987-3725686 19870803; GB 2194553 A GB 1987-18302 19870803; FR 2602179 A FR 1987-10816 19870730; JP 63042396 A JP 1987-175138 19870804; JP 2829606 B2 JP 1987-195138 19870804
FDT JP 2829606 B2 Previous Publ. JP 63042396
PRAI US 1986-892624 19860804
AB DE 3725686 A UPAB: 19930923
A composite object possessing long-term and fatigue strength has an applied **metal coating**, which possesses a permanent internal compressive stress. The compressive stress in the **metal coating** is pref. between -34.5 and -103.4 **MPa**. Pref. thickness of the coating is 0.051-0.51 micron. Pref. **metals** for the **coating** are Ni, Co or Ni-**Co alloy**. The coating may be bonded to the substrate by means of an electrically conducting layer, esp. of copper.
USE/ADVANTAGE - For objects requiring good long-term and fatigue -strength, esp. the fixed outlet guide vanes of a gas turbine for use in airfract engines, more specifically where the substrate material is a polyether imide resin reinforced with graphite fibres. An increase in static strength of up to 380% is obtd., combined with resistance to more than 1 million low-frequency oscillations as a fatigue test.
0/4

L27 ANSWER 17 OF 18 WPIX (C) 2002 THOMSON DERWENT
AN 1981-70101D [39] WPIX
TI Steel clad with **nickel alloy** by explosion plating - using intermediate layer of stainless steel to minimise internal tensile stressed in clad prod..
DC M23 P55 P73
IN KOECHER, R; RICHTER, U
PA (DYNN) DYNAMIT NOBEL AG
CYC 6
PI EP 35648 A 19810916 (198139)* DE 6p

R: DE FR GB IT NL SE
DE 3008238 A 19810917 (198139)
DE 3008238 C 19821209 (198250)
EP 35648 B 19831005 (198341) DE
R: DE FR GB IT NL SE
DE 3161063 G 19831110 (198346)
PRAI DE 1980-3008238 19800304
AB EP 35648 A UPAB: 19930915
The substrate consists of plain or low alloy steel **coated** with a **metal** (I), and then a **nickel alloy** (II). Alloy (II) contains e.g. Mo, and has a high resistance to corrosion. During explosion plating, the intermediate layer (I) undergoes a larger amt. of cold compaction than the substrate, but a smaller amt. of cold compaction than the outer cladding (II); and during subsequent heat treatment of the laminate, no harmful diffusion occurs from layer (I) to cladding (II).
Layer (I) pref. consists of stainless steel, esp. austenitic stainless steel, and can be 0.5-2.5 mm thick. The object of the invention is to reduce internal **tensile stresses** in the laminate.

L27 ANSWER 18 OF 18 JAPIO COPYRIGHT 2002 JPO
AN 1995-244142 JAPIO
TI MAGNETIC SENSOR
IN ENDOU MICHIKO; SHIMIZU SHINKICHI; KURASHIMA SHIGEMI; KAWAMOTO MIEKO
PA FUJITSU LTD, JP (CO 000522)
PI JP 07244142 A 19950919 Heisei
AI JP1994-37024 (JP06037024 Heisei) 19940308
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 95, No. 9
AB PURPOSE: To obtain the magnetic sensor whose sensitivity can be made high in a very small magnetic field by a method wherein the direction of spontaneous magnetization is changed forcibly from an easy direction of magnetization to a hard direction of magnetization by properly combining the direction of the strain of a magnetic substance with the positive/the negative of the magnetization constant of the magnetic substance.
CONSTITUTION: A meander shaped sensor pattern 21 which uses a ferromagnetic-**metal** thin **film** is formed on the surface of a substrate 22. When, e.g. an iron-**nickel alloy** is used for the ferromagnetic-**metal** thin **film**, an easy direction of magnetization in its strainless state is the lengthwise direction of the pattern, and a hard direction of magnetization is the short direction of the pattern. Then, since a magnetization constant is positive, the spontaneous magnetization of the sensor pattern 21 is directed to the hard direction of magnetization when a **tensile stress** is applied to the short direction of the sensor pattern 21, i.e., to the hard direction of magnetization. As a result, when a magnetic field Hex is applied to the lengthwise direction of the sensor pattern 21 in this state, the direction of magnetization is changed into the easy direction of magnetization. As a result, a change in magnetization in a very small magnetic field is made smooth, and the high sensitivity of the magnetic sensor can be achieved.